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QVT[®] 101

Maintenance Guide



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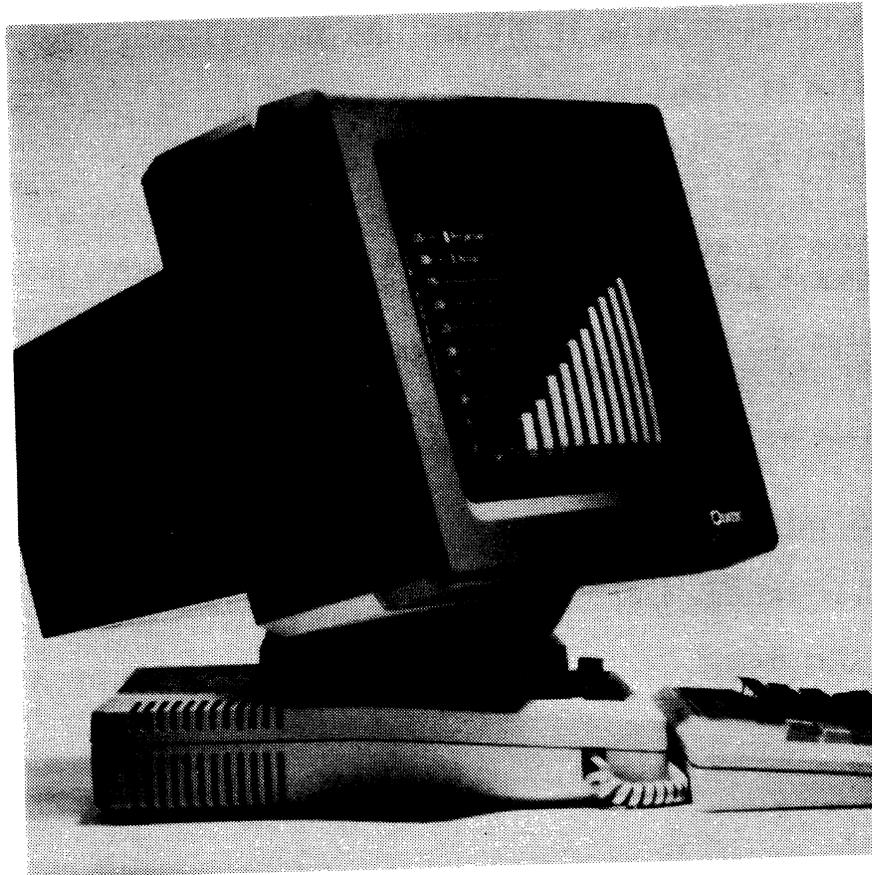
Reorder Number 35057
April 1985

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PREFACE

The QVT-101 Maintenance Guide has been designed to allow maintenance personnel to service the QVT-101™ Terminal by quickly isolating a fault and taking corrective action in a minimum amount of time. It is assumed that all service personnel who may use this guide have rudimentary knowledge of video display terminals and related maintenance practices.

The QVT-101 Maintenance Guide is divided into the following sections:

- **Section 1: Troubleshooting** - for isolating a fault to a subassembly.
- **Section 2: Subassembly Removal and Replacement** - procedures for removing and replacing a defected subassembly.
- **Section 2: Alignment** - procedures for performing any necessary video alignment after replacing a subassembly.
- **Section 3: Parts** - information for identification of replaceable parts and recommended spares.
- **Section 4: Circuits and Diagrams** - reference material.

ASSOCIATED PUBLICATIONS

For general User Information:

QVT-101 Operator Manual.....Reorder Number 35073

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SECTION 1

TROUBLESHOOTING

INTRODUCTION

This section provides a troubleshooting method for isolating most QVT-101 failures to an easily replaced subassembly, by systematically advancing through a series of troubleshooting flowcharts.

TROUBLESHOOTING TECHNIQUE

Effective troubleshooting technique should always begin with a thorough visual inspection. Look for obvious things that may adversely effect the performance of the terminal, such as:

- Is the AC power source supplying adequate power,
- Is the brightness potentiometer properly adjusted,
- Are all connectors making good contact,
- Is there a compatibility problem between the terminal and the host?

TROUBLESHOOTING FLOWCHARTS

When using the following troubleshooting flowcharts, always begin with Fault Isolation Flowchart # 1. Although each flowchart is more or less tailored to troubleshoot a general area, it should be noted that they have been purposefully arranged to quickly isolate a fault to a replaceable subassembly. It is not recommended that the flowcharts be used out of sequence.

Refer to the Circuits and Diagrams Section for more specific information as necessary.

Tools and Equipment Required

- DB25 Loopback Connector,
- Phillips Screwdriver,
- Multimeter,
- High Voltage Probe,
- Interconnect Wiring Diagram and Schematics (refer to Section 5).

Fault Isolation Flowchart # 1

Power on unit.

Does unit display an error code? ---YES---> Proceed to Table 1-1 Error Codes Summary at end of this section.

-NO

Perform Self-Test (press ESC/shift V keys).

Does unit perform Self-Test? ---NO---> Proceed to Flowchart # 2.

-YES

Exit Self-Test, enter Local mode. Press each key on keyboard.

Are characters displayed as keys are pressed? ---NO---> Proceed to Flowchart # 3.

-YES

Exit Local mode, enter On Line mode & Full Duplex mode. Install loopback connector to EIA port. Press each key on keyboard.

Are characters displayed as keys are pressed? ---NO---> Defective Power/Logic PCB. Replace Power/Logic PCB (refer to Section 2).

-YES

Connect printer to AUX port. Exit On Line mode & enter Local mode. Print.

Fault Isolation Flowchart # 1 (Cont)

Is screen data printed? ---NO---> Defective Power/Logic PCB. Replace Power/Logic PCB (refer to Section 2)

-YES

Unit checks OK.

Fault Isolation Flowchart # 2

From Flowchart # 1.

Is AC line fuse good? ---NO---> Replace bad fuse. Continue.

-YES

Does fuse fail again at power on? --NO---> Return. Begin Flowchart # 1.

-YES

Verify operation of ON/OFF switch.

Is switch defective? ---NO---> Return. Begin Flowchart # 1.

-YES

Replace switch (refer to Section 2). Continue.

Does fuse fail again at power on? --NO---> Return. Begin Flowchart # 1.

-YES

Replace fuse. Disconnect P5 to isolate power transformer. Measure transformer output and verify voltage (23 volts AC ± 10%).

Is voltage present? ---NO---> Power transformer is defective. Replace power transformer (refer to Section 2).

-YES

Power transformer checks OK. Power off unit and reconnect power transformer connector P5 on Power/Logic PCB. Disconnect P19 and the keyboard telephone jack from the Power/Logic PCB. Power on unit.

Fault Isolation Flowchart # 2 (Cont)

Does fuse fail again at power on? --NO----> Power/Logic PCB checks OK. Keyboard or Video PCB is defective. Continue.

-YES

Replace fuse. Connect keyboard telephone jack to the Power/Logic PCB. Power on unit.

Does fuse fail again at power on? --NO----> Keyboard checks OK. Video PCB is shorted. Replace Video PCB (refer to Section 2). Return to Flowchart # 1.

-YES

Keyboard or coiled keyboard cable is defective. Return to Flowchart # 1.

Fault Isolation Flowchart # 3

From Flowchart # 1.

Is +12 Vdc and GND present at P11
on Keyboard PCB (pin 1, GND/pin 2, +12 Vdc) ---NO---> Coiled keyboard cable
is defective. Replace
coiled keyboard cable
(refer to Section 2).

-YES

Is 10 Vdc + 1V present at test point K1 on
Power/Logic PCB? ---NO---> Power/Logic PCB is defective. Replace Power/Logic
PCB (refer to Section 2).

-YES

Depress each key on keyboard for a minimum
of 2 seconds each and observe for an AC RMS
voltage at test point K1 on Power/Logic PCB.

Does this voltage increase to approx. 200 mVac RMS while
each key is pressed? ---NO-----> Keyboard is defective. Replace keyboard
assembly (Refer to Section 2).

-YES

Is the correct character displayed. -----NO-----> Proceed to Flowchart # 4.

-YES

Unit checks OK. Proceed to System Test.

Fault Isolation Flowchart # 4

From Flowchart # 3.

Check the following voltages on the Power/Logic PCB:

U1	Pin 12	+5 Vdc	U5	Pin 1	-12 Vdc
U1	Pin 1	Gnd	U5	Pin 14	+12 Vdc

Are all voltages present? --NO---> Defective power supply circuit. Repair.

-YES

Verify proper operation of the brightness control. Rotate control fully CCW, then fully CW. Observe a 300 mVdc voltage change between pins 1 and 2 of P7.

Does voltage change by approx. 300 mVdc? ---NO---> Brightness control is defective. Replace brightness control (refer to Section 2).

-YES

Blank screen (Shift-Home/Clear). At P19, pin 5 observe for an AC RMS voltage. Display self-test (ESC V). At P19, pin 5 observe for an AC RMS voltage.

Did voltage increase to approximately 400 mVac RMS when self-test was displayed? ---NO---> Power/Logic PCB is defective. Replace Power /Logic PCB (refer to Section 2).

-YES

Proceed to Flowchart # 5.

Fault Isolation Flowchart # 5

From Flowchart # 4.

Display "H" Test Pattern (Setup-Zero).

Check voltages on Video PCB, P1:

D-102 Anode	+12 Vdc
D-104 Anode	GND

Are voltages present? ---NO---> Defective power supply circuit. Repair

-YES

With brightness control fully CW, check at junction of R551 and R553 for approx. 400 mVac RMS.

Is approx. 400 mVac RMS present? ---NO---> Defective power supply circuit. Repair.

-YES

With a high voltage probe, check the CRT anode cap for approx. 13 kVdc.

< **WARNING: HIGH VOLTAGE**

Is there approximately 13 kVdc present at the CRT anode cap? ----NO----> Video PCB defective. Replace Video PCB (refer to Section 2).

-YES

Check the following voltages on the Video PCB (tolerance \pm 25%):

CAUTION

Take precautions when handling the CRT. **DO NOT** scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass.

Hazardous voltages are present in the general area of the flyback transformer lead and the CRT anode cap. Exercise caution to avoid electrical shock when performing any video alignment procedure. Remember that the terminal is powered ON.

P3, Pin 2	0.3 Vac RMS	G2	550 Vdc
P3, Pin 1	1.3 Vac RMS	D154 cathode	45 Vdc
P4, Pin 2	10 Vac RMS	G4	175 Vdc
P4, Pin 1	25 Vac RMS	Q503 Col.	12 Vdc
G1	-28 Vdc		

Are all voltages present? ---NO---> Video PCB defective. Replace Video PCB
(refer to Section 2).

-YES

CRT defective. Replace CRT (refer to Section 2).

ERROR CODES SUMMARY

As part of the terminal's power on sequence, it performs an internal self-test, and signals that it has successfully completed this test by sounding the audible alarm. However, if a non-fatal error is detected, an error code will be displayed on the screen. For example, if the letter "D" is displayed, this signifies that a fault has been isolated to the Power/Logic PCB (i.e. IC U18). The following table lists all possible error codes.

Table 1-1. Error Codes Summary

ERROR CODE	CORRECTIVE ACTION
A	Replace U10, or the Power/Logic PCB.
B	Replace U8, U9, or the Power/Logic PCB.
C	Replace U8, U9, U10, or the Power/Logic PCB.
D	Replace U18, or the Power/Logic PCB.
E	Replace U10 and U18, or the Power/Logic PCB.
F	Replace U8, U9 and U18, or the Power/Logic PCB.
G	Replace U8, U9, U10 and U18, or the Power/Logic PCB.
H	Replace the keyboard.
I	Replace U10, or the Power/Logic PCB, and the keyboard.
J	Replace U8 and U9, or the Power/Logic PCB, and the keyboard.
K	Replace U8, U9 and U10, or the Power/Logic PCB, and the keyboard.
L	Replace U18, or the Power/Logic PCB and the keyboard.
M	Replace U10 and U18, or the Power/Logic PCB and the keyboard.
N	Replace U8, U9 and U18, or the Power/Logic PCB and the keyboard.
O	Replace U8, U9, U10 and U18, or the Power/Logic PCB and the keyboard.

Note: U8, U9, U10 and U18 are located on the Power/Logic PCB.

SUBASSEMBLY REMOVAL AND REPLACEMENT

INTRODUCTION

This section describes how to remove and replace the major subassemblies of the QVT-101. Before beginning, place the Power On/Off switch in the OFF position and disconnect the power cord from the power source. Thoroughly read each procedure before attempting any subassembly removal and replacement.

SAFETY SUMMARY

Always remember that the terminal modules contain extremely high voltages. If proper precautions are not taken, contact with these voltages can result in injury. Observe the following precautions.

- Unless otherwise instructed by procedures in this manual, always turn off the terminal power with the rocker-type power switch on the rear of the monitor base and unplug the power cord from the monitor before removing the cover or attempting subassembly removal or adjustment.
- Always read the removal and replacement instructions carefully before attempting the removal of any subassembly.
- Take special precautions when working with the CRT. Do not scratch or strike the CRT, or subject it to unusual pressure. The CRT contains a high vacuum; breaking the CRT may cause injury from flying glass or high voltages. As a precaution wear eye protection when working with the CRT.

REQUIRED TOOLS

The tools required for removal and replacement of subassemblies are listed below.

- Phillips screwdriver, medium (No. 2 tip)
- Soldering equipment
- Keycap extraction tool (Qume Part Number 84873-01)

Lower Monitor Area

The lower monitor area contains the Power/Logic PCB and the line transformer, and brightness control.

CAUTION

Hazardous voltages are exposed in the general area of the AC input circuit, line transformer, and power supply. Before performing any service in the lower monitor area, power OFF the terminal and disconnect the power cord.

SUBASSEMBLY REMOVAL AND REPLACEMENT

Upper Monitor Area

The upper monitor area contains the CRT and the video PCB.

CAUTION

Take special care when working in the general area of the CRT. Do not scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass. As a further precaution wear suitable clothing and eye protection.

A hazardous residual voltage may be present on the CRT at the flyback transformer anode cap. Always discharge the CRT anode to ground before performing any maintenance in the upper monitor area (refer to Step 2 of the Video PCB Removal and Replacement procedure).

COVER SETS

The paragraphs below describe the removal and replacement of the cover sets for the keyboard and monitor. This procedure prefaces the removal and replacement of the other QVT-101 subassemblies.

Keyboard - Top Cover

The top cover of the keyboard is secured from the underside of the keyboard assembly by six screws.

REMOVAL

1. Disconnect the keyboard cable from the monitor.
2. Place the keyboard upside down on a level surface and remove the six screws. Lift the bottom cover with keyboard PCB away from the top cover.

REPLACEMENT

To replace the top cover, repeat removal instruction in reverse order.

Keyboard - Bottom Cover (Keyboard PCB and Coiled Keyboard Cable)

To remove and replace the bottom keyboard cover, it is also necessary to remove and replace the keyboard PCB and the keyboard cable.

REMOVAL

1. Remove the top cover from the keyboard assembly. Refer to the Keyboard Top Cover Removal and Replacement procedure.
2. Remove the six screws that secure the keyboard PCB to the bottom cover. However, the two screws with tabs, located at bottom center of keyboard, do not have to be removed, just loosen each tab/screw and move holddown tab to one side. See Figure 2-1.
3. Lift the keyboard PCB up and lay it over the back edge of the bottom cover. See Figure 2-2.
4. Disconnect the coiled keyboard cable from the keyboard PCB and remove the cable from its retainers on the inside of the bottom cover. Be careful not to damage the cable by overstressing its applying excessive force to its terminations. Remove the keyboard cable, keyboard PCB, and bottom cover.

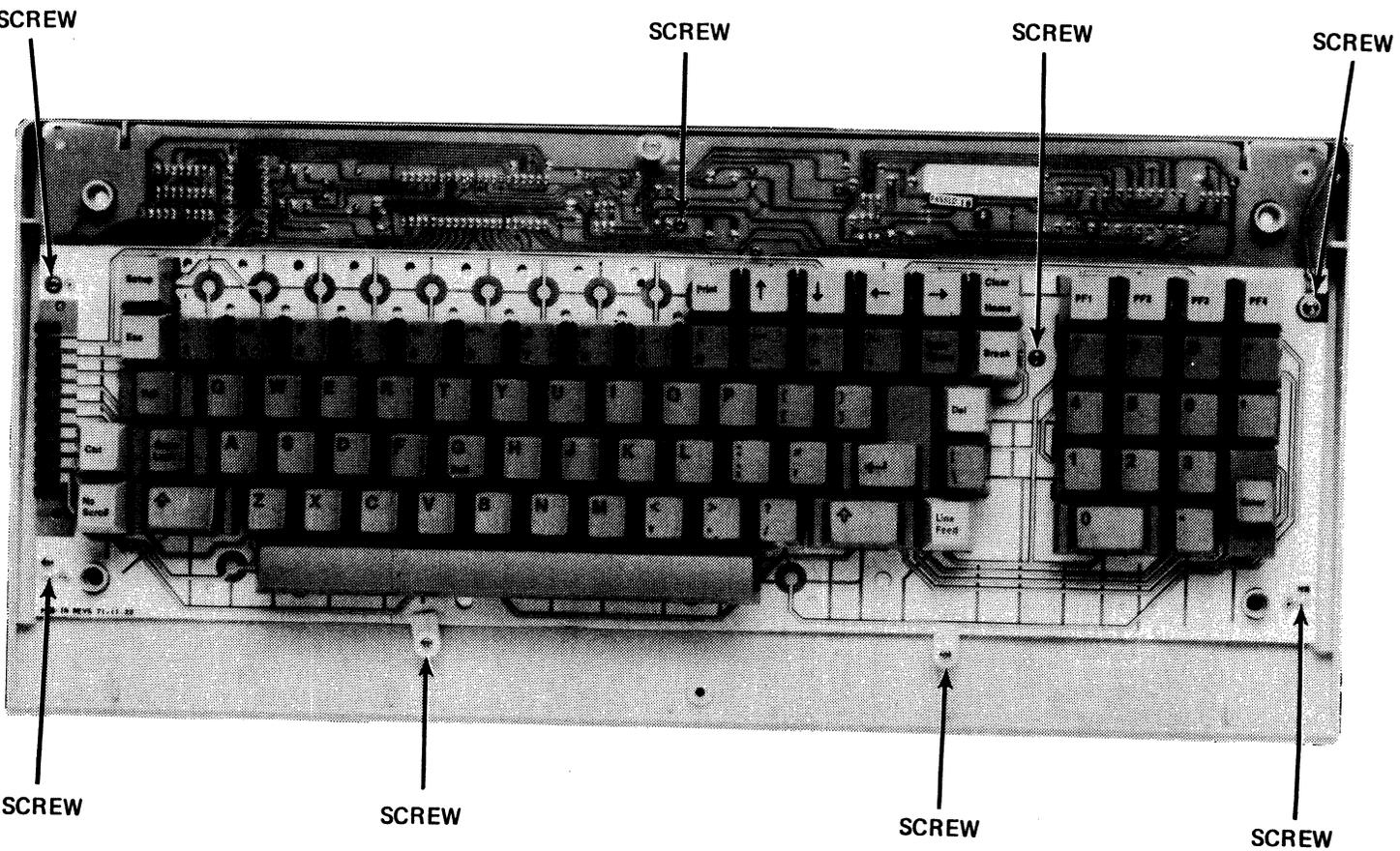


Figure 2-1. Keyboard Top Cover Removed

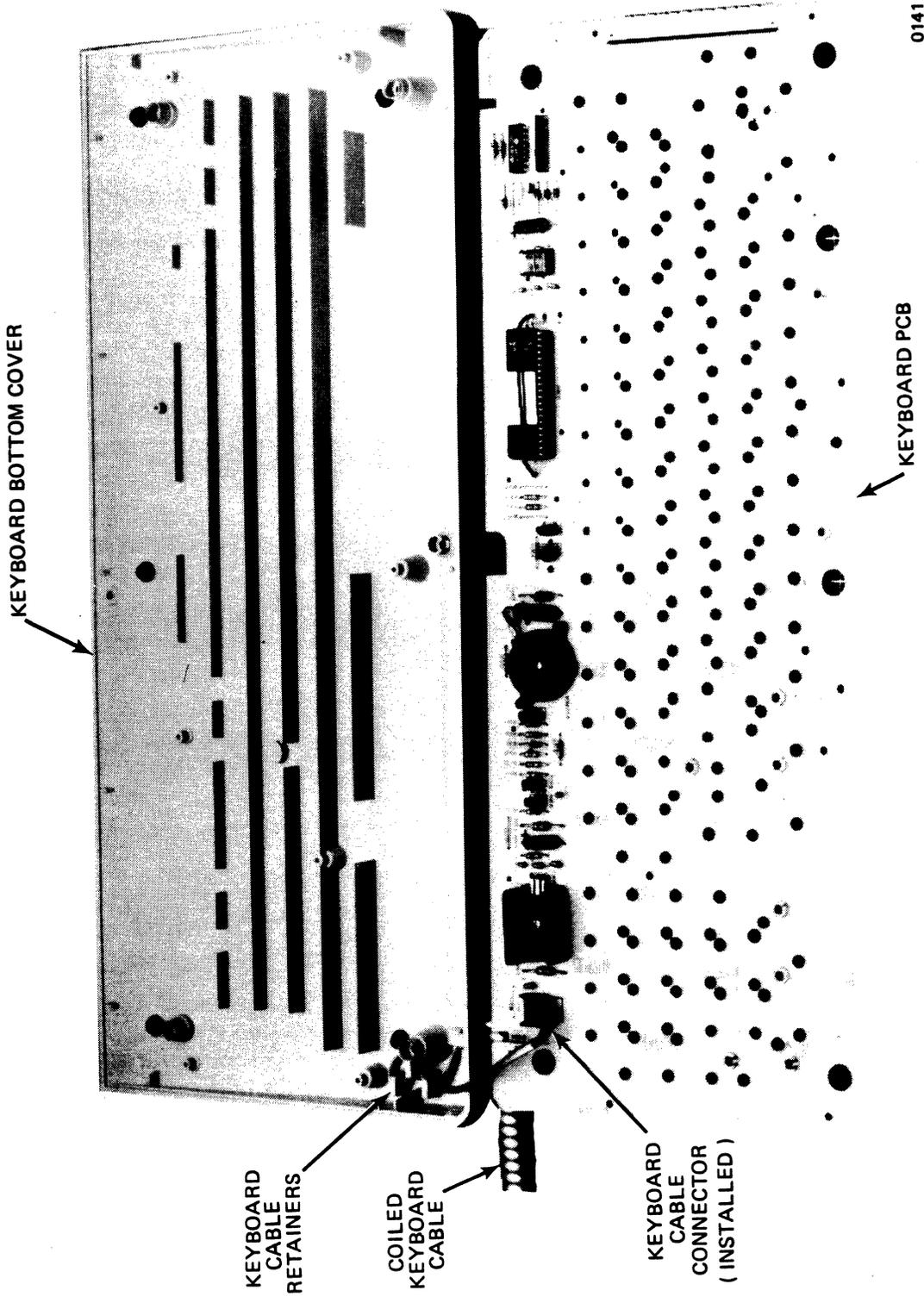


Figure 2-2. Keyboard PCB Removal and Replacement

SUBASSEMBLY REMOVAL AND REPLACEMENT

REPLACEMENT

1. Insert the coiled keyboard cable through its access hole in the bottom cover and secure it to its retainers. Be careful not to damage the cable by overstressing its tensile strength. Connect the keyboard cable connector to the keyboard PCB. See Figure 2-1.
2. Install the keyboard PCB in the bottom cover and secure it in place with eight screws. See Figure 2-2.
3. Replace the top cover on the keyboard assembly. Refer to the Keyboard Top Cover Removal and Replacement procedure.

Key Caps

REMOVAL

A key cap can be removed by gripping it between index finger and thumb and pulling up or more preferably with a Key Cap Puller Tool (Qume Part Number 84873-01). See Figure 2-3.

REPLACEMENT

To replace a key cap, position it over its location and press downward with gentle pressure. Be sure to position the key cap so that its four alignment tabs engage the key cap plunger. See Figure 2-3.

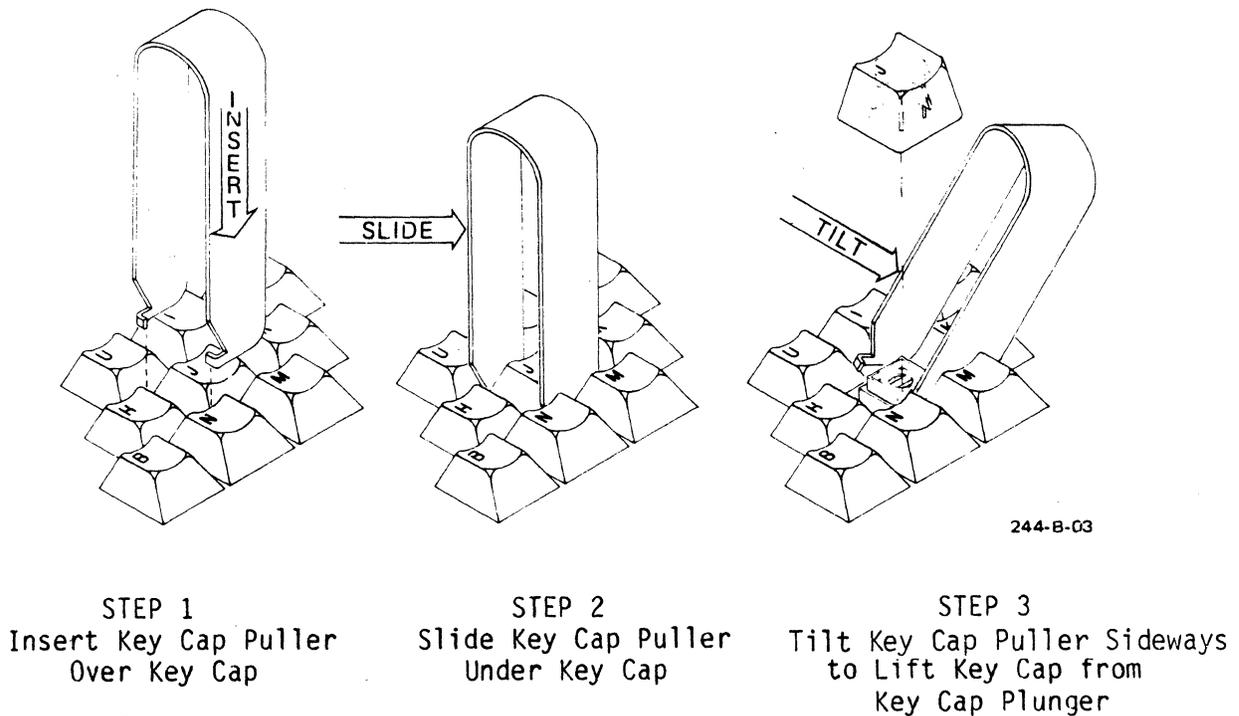


Figure 2-3. Key Cap Removal and Replacement

Monitor - Back Cover

REMOVAL

To remove the back cover for access to the upper monitor area (CRT and video PCB), proceed as follows. See Figure 2-4.

WARNING

Hazardous voltages are exposed when the Monitor Back Cover is removed. Power OFF the terminal and disconnect the power cord (unless an alignment procedure is to be performed).

Discharge the CRT anode to ground to avoid electrical shock before removing or replacing any upper monitor area subassembly (refer to Step 2 of the Video PCB Removal and Replacement procedure).

Take precaution when working in the general area of the CRT. Do not scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass. As a precaution wear suitable clothing and eye protection.

1. Orient the monitor to gain screwdriver access to the bottom edge of the monitor back cover.
2. Remove the two screws that secure the back cover to the monitor, and slide the back cover to the rear until it is free of its support tracks on the display swivel support.

REPLACEMENT

To replace back cover, perform removal instructions in reverse order.

SUBASSEMBLY REMOVAL AND REPLACEMENT

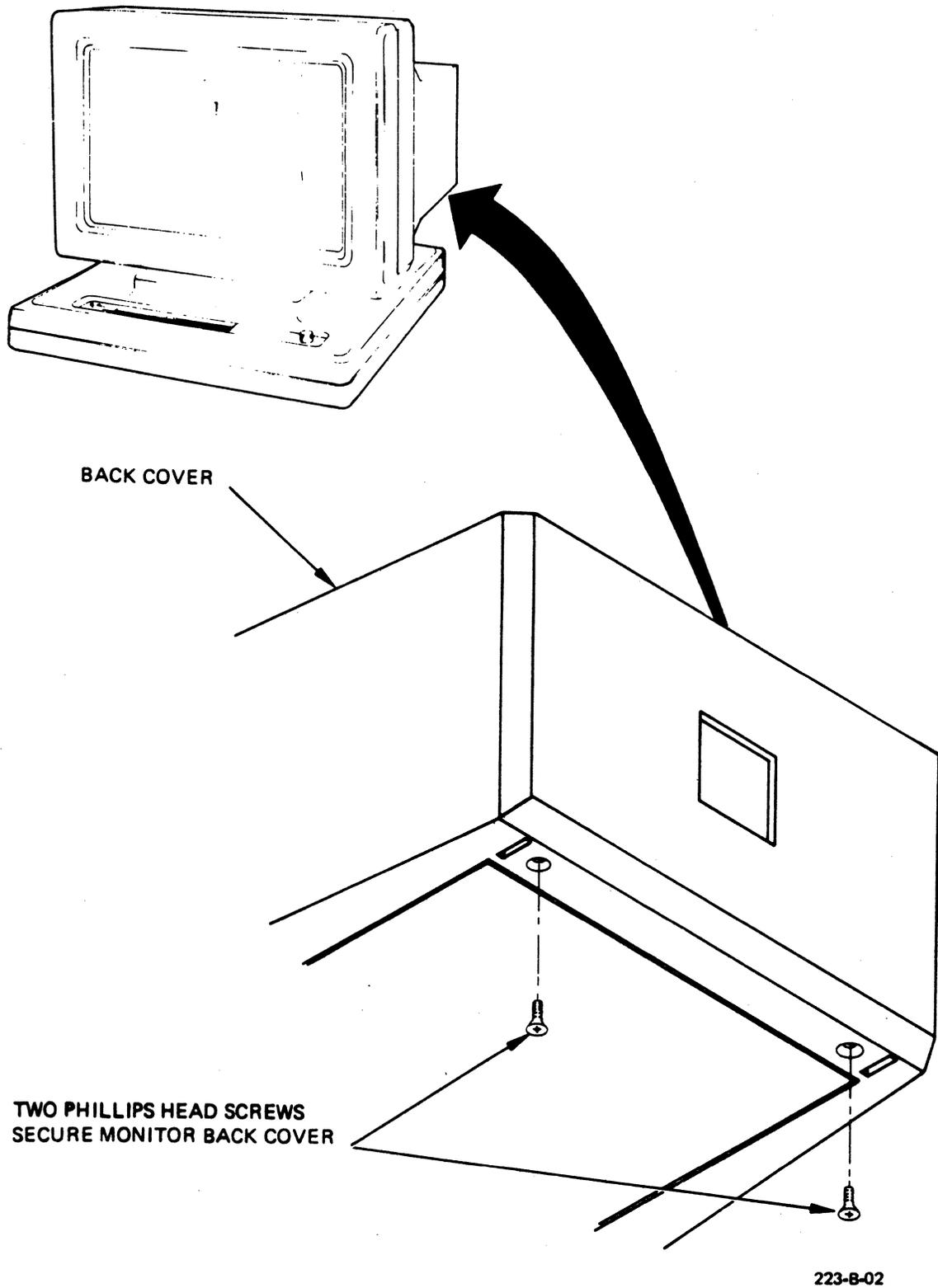


Figure 2-4. Monitor Back Cover Removal and Replacement

Monitor - Bottom Cover

REMOVAL

To remove the bottom cover for access to the lower monitor area (Power/Logic PCB, proceed as follows. See Figure 2-5.

CAUTION

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in the lower monitor area, power OFF the terminal and disconnect the power cord.

1. Remove the knob from the brightness potentiometer.
2. Lay the monitor on its side and loosen the four recessed screws at the corners. These screws are captive screws, so it is not necessary to remove them.
3. Remove the bottom cover from the monitor. To remove any of the subassemblies mounted on the inside of the bottom cover, refer to the appropriate removal procedure.

REPLACEMENT

To replace bottom cover, perform removal instructions in reverse order.

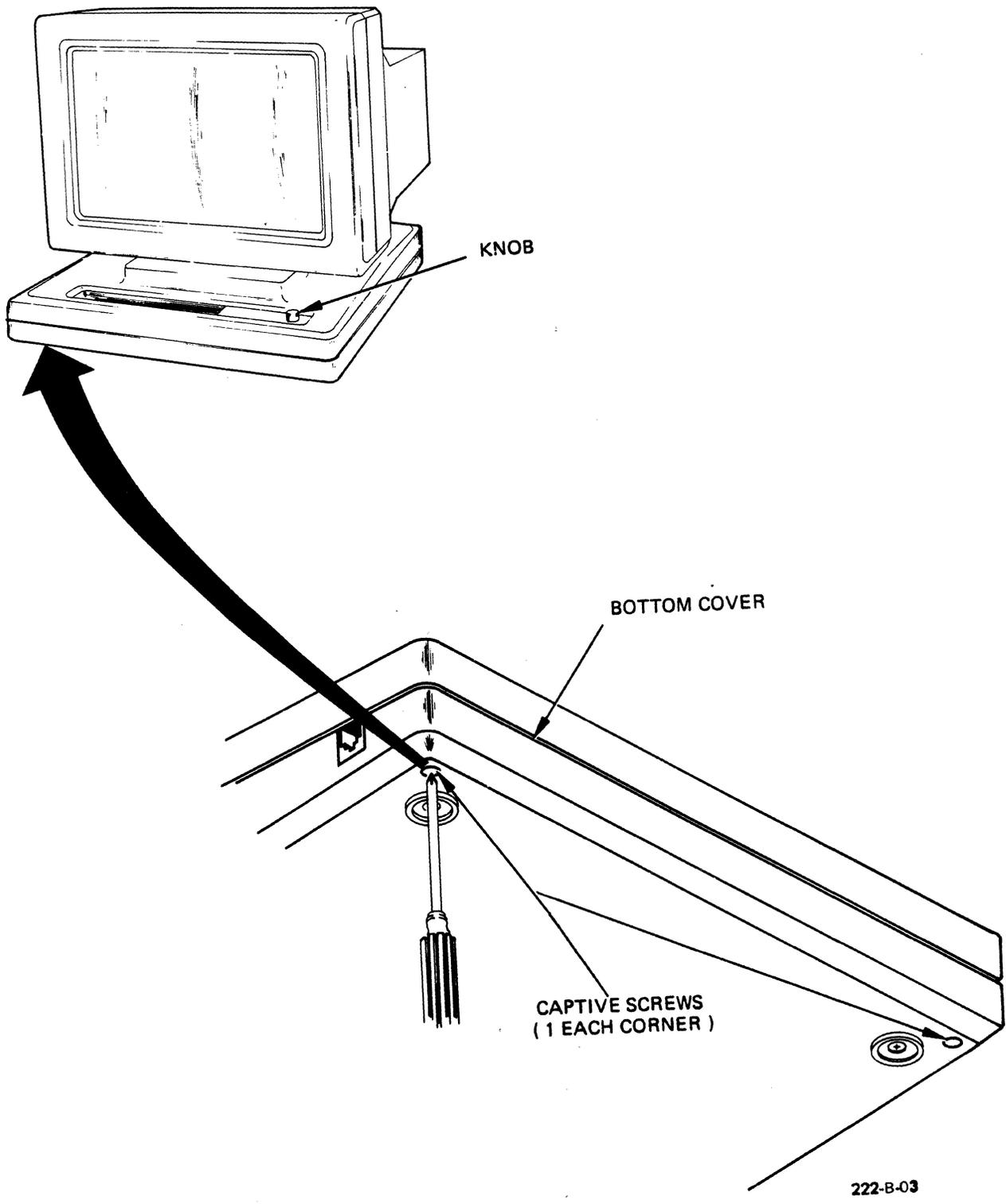


Figure 2-5. Monitor Bottom Cover Removal and Replacement

LOWER MONITOR AREA SUBASSEMBLIES

The Lower Monitor Area contains the following subassemblies. See Figure 2-6.

- Power/Logic PCB,
- Power On/Off Switch,
- Fuse Holder,
- RAM Backup Battery,
- Brightness Control
- Line Transformer
- Filter PCB

SUBASSEMBLY REMOVAL AND REPLACEMENT

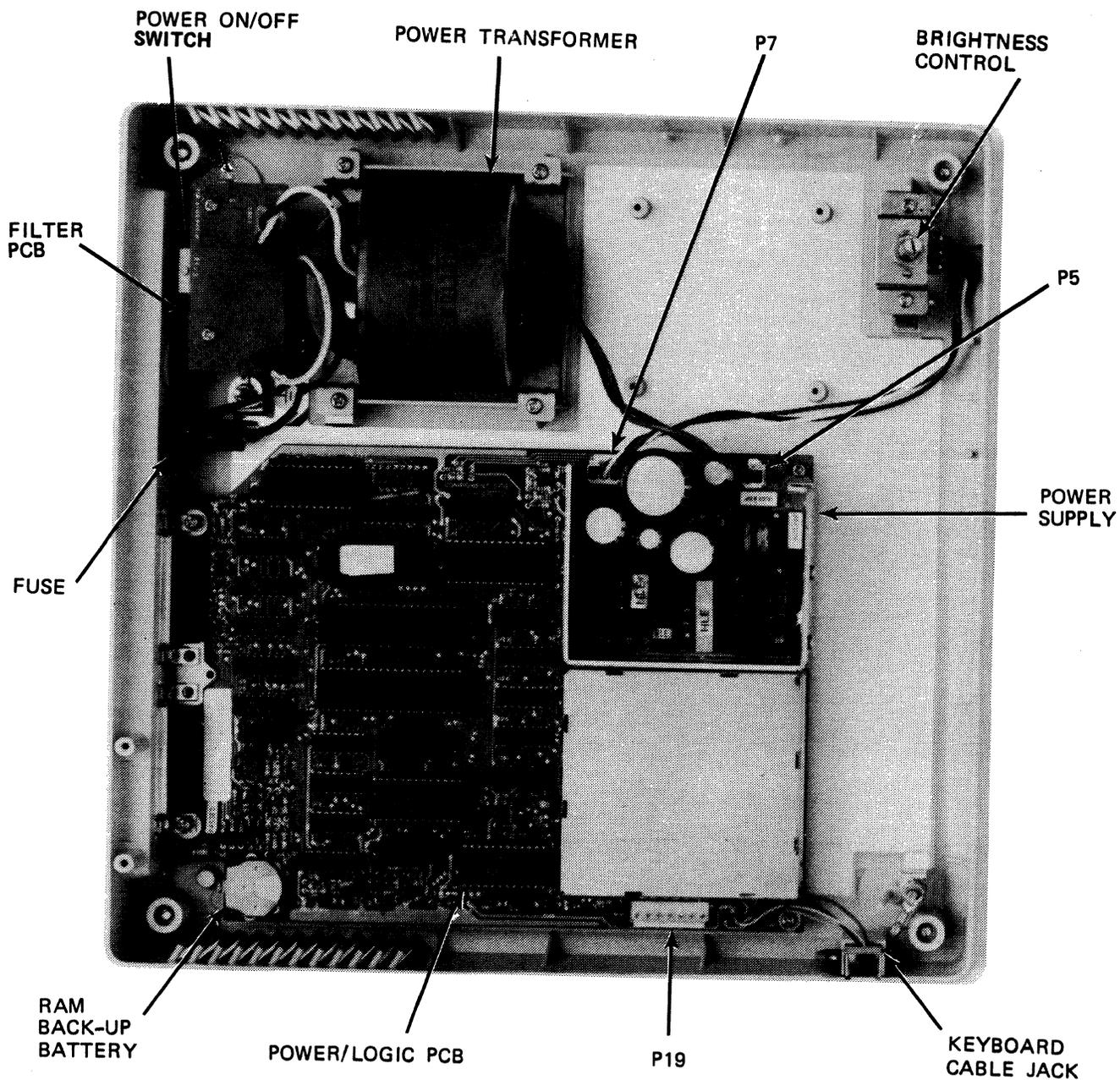


Figure 2-6. Lower Monitor Area

Power/Logic PCB

REMOVAL

CAUTION

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in this area, power OFF the terminal and disconnect the power cord.

1. Gain access to the lower monitor area. Refer to the Monitor - Bottom Cover Removal and Replacement procedure.
2. Disconnect the following connectors from the Power/Logic PCB. See Figure 2-6.

P5	Transformer
P19	Video PCB,
P7	Brightness potentiometer,

3. Remove the ground strap from the keyboard input jack.
4. Remove the keyboard input jack from the lower monitor area.
5. Remove the four screws that secure the Power/Logic PCB (and the chassis ground strap on the keyboard input jack) to the bottom cover. Lift the Power/Logic PCB from the bottom cover.

REPLACEMENT

To replace Power/Logic PCB, perform removal instructions in reverse order.

SUBASSEMBLY REMOVAL AND REPLACEMENT

Transformer

REMOVAL

CAUTION

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in this area, power OFF the terminal and disconnect the power cord.

1. Gain access to the lower monitor area. Refer to the Monitor - Bottom Cover Removal and Replacement procedure.
2. Disconnect connector P5 from the Power/Logic PCB assembly. See Figure 2-7.
3. Remove the two screws that secure the Filter PCB. See Figure 2-7.
4. Remove the Filter PCB and unsolder the two leads that are part of the transformer assembly.
5. Remove the four screws that secure the transformer assembly to its mounting studs. Remove the transformer assembly.

REPLACEMENT

To replace transformer, perform removal instructions in reverse order.

Power On/Off Switch

REMOVAL

CAUTION

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in this area, power OFF the terminal and disconnect the power cord.

1. Gain access to the lower monitor area. Refer to the Monitor - Bottom Cover Removal and Replacement procedure.
2. Remove the two screws that secure the filter PCB and the power switch with bracket in the bottom cover. See Figure 2-7.
3. Remove the filter PCB; it is not necessary to unsolder its four connecting leads.
4. Note the arrangement of the four leads on the power switch. Unsolder these leads and remove the power switch with its mounting bracket.
5. Remove the two screws that secure the power switch to its mounting bracket. Remove the power switch.

REPLACEMENT

To replace power on/off switch, perform removal instructions in reverse order.

Fuse Holder

REMOVAL

CAUTION

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in this area, power OFF the terminal and disconnect the power cord.

SUBASSEMBLY REMOVAL AND REPLACEMENT

1. Gain access to the lower monitor area. Refer to the Monitor - Bottom Cover Removal and Replacement procedure.
2. Note the arrangement of the two leads on the fuse holder. Unsolder these leads from the fuse holder. See Figure 2-7.
3. With a small adjustable wrench, remove the nut and washer that secure the fuse holder to the inside of the bottom cover. Remove the fuse holder.

REPLACEMENT

To replace fuse holder, perform removal instructions in reverse order.

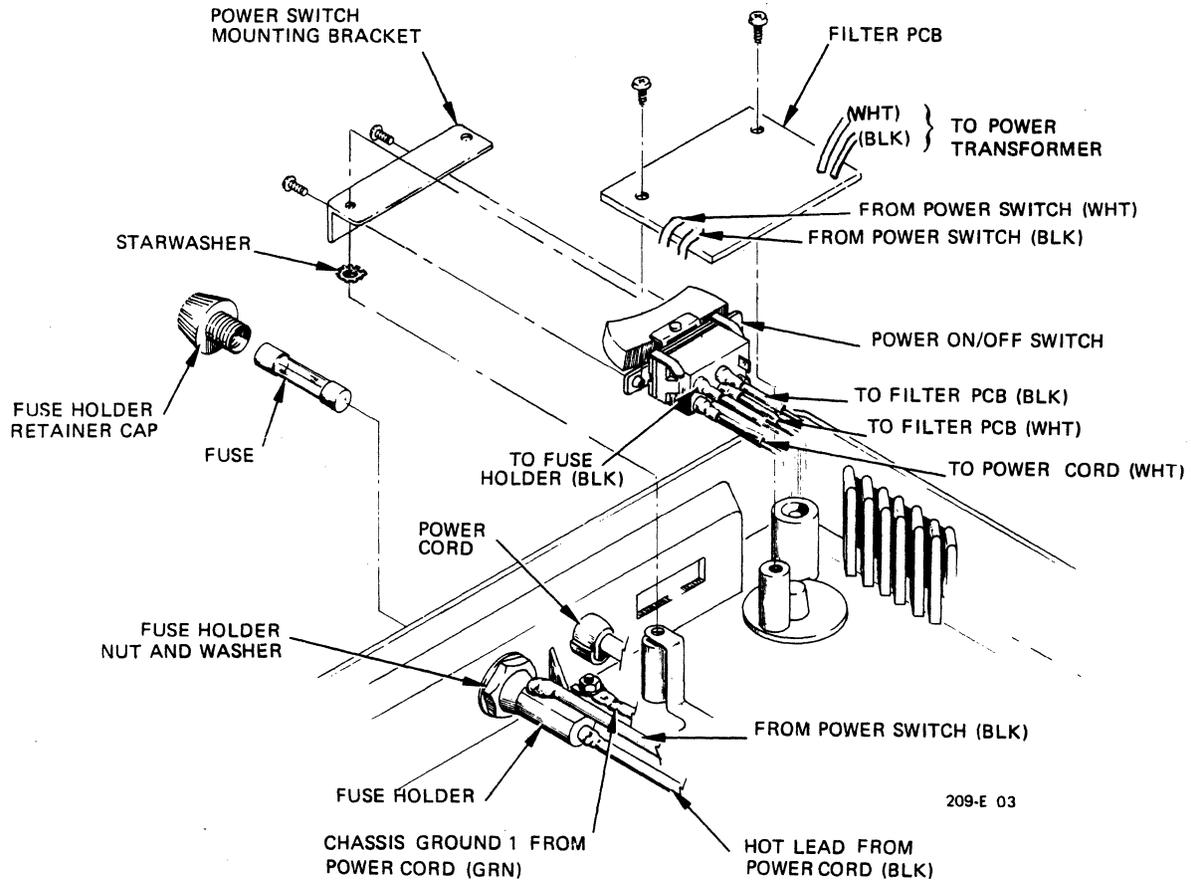


Figure 2-7. Power ON/OFF Switch and Fuse Holder Removal and Replacement

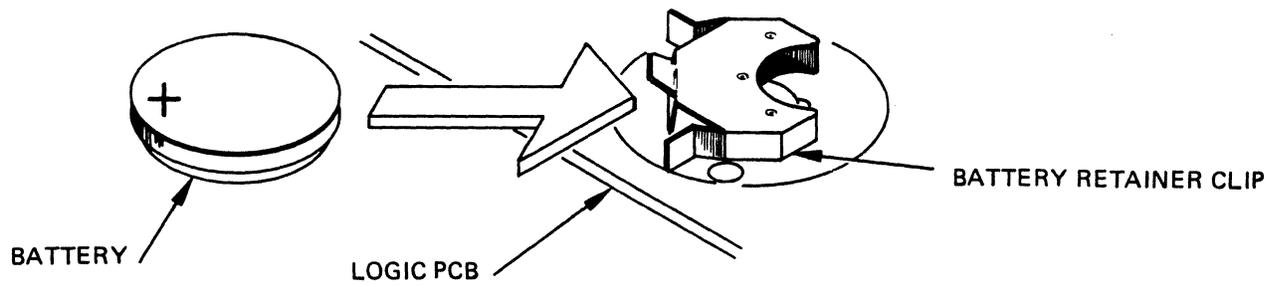
Battery

REMOVAL AND REPLACEMENT

CAUTION

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in this area, power OFF the terminal and disconnect the power cord.

The battery is easily removed and replaced by sliding it in and out of its retainer clip on the Power/Logic PCB (see Figure 2-8). As a reference, note the status line set-up configuration of the terminal before removing the battery. Once the battery is replaced, if after power is turned ON the status line appears to be altered, execute a Shift-D and reconfigure the status line as appropriate.



695-A-02

Figure 2-8. Battery Removal and Replacement

Brightness Control

REMOVAL

WARNING

Hazardous voltages are exposed in the general area of the power supply. Before performing any service in this area, power OFF the terminal and disconnect the power cord.

1. Gain access to the lower monitor area. Refer to the Monitor - Bottom Cover Removal and Replacement procedure.
2. Disconnect the brightness control connector (P7) from the Power/Logic PCB. See Figure 2-6.
3. Remove the two screws that secure the brightness control and mounting bracket to the bottom cover. See Figure 2-9.
4. With a small adjustable wrench, remove the nut that secures the brightness control to the mounting bracket. Remove the brightness control.

REPLACEMENT

To replace the brightness control, perform removal instructions in reverse order.

SUBASSEMBLY REMOVAL AND REPLACEMENT

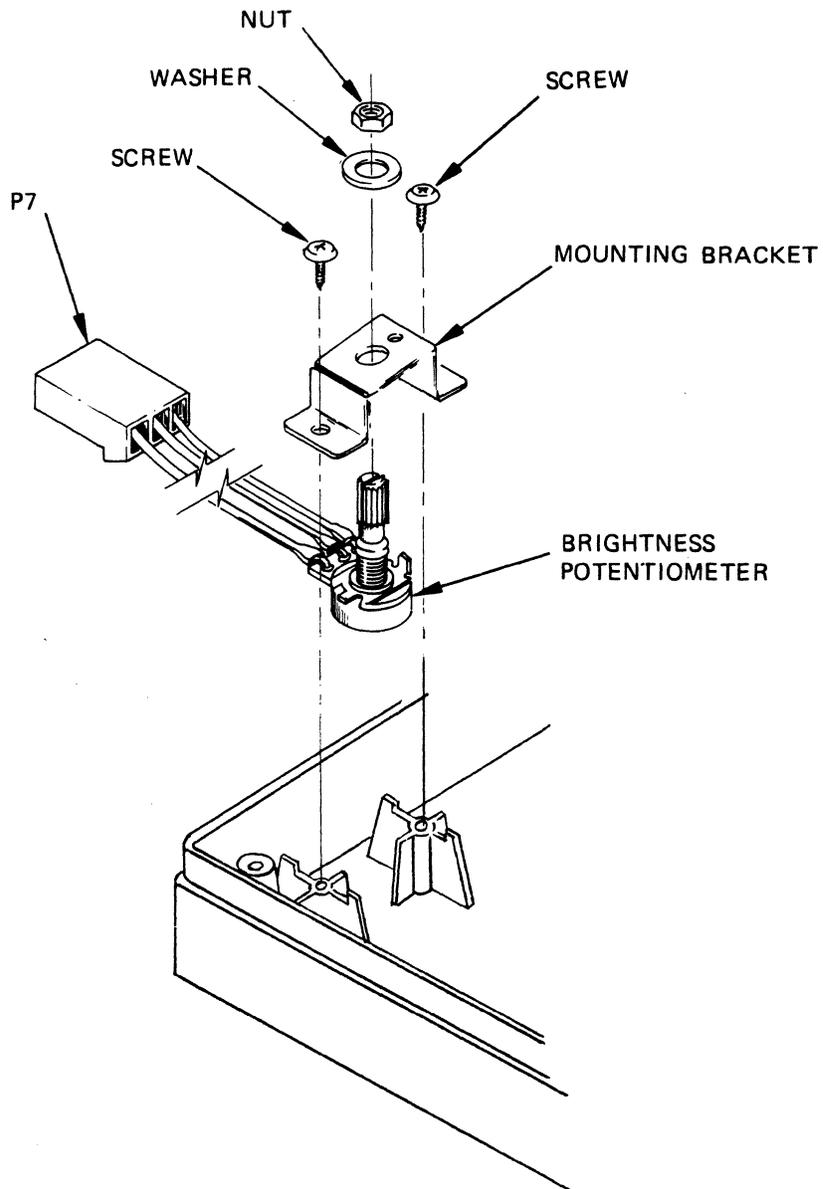


Figure 2-9. Brightness Potentiometer Removal and Replacement

UPPER MONITOR AREA SUBASSEMBLIES

The Upper Monitor Area contains the following subassemblies. See Figure 2-10.

- Video PCB,
- CRT.

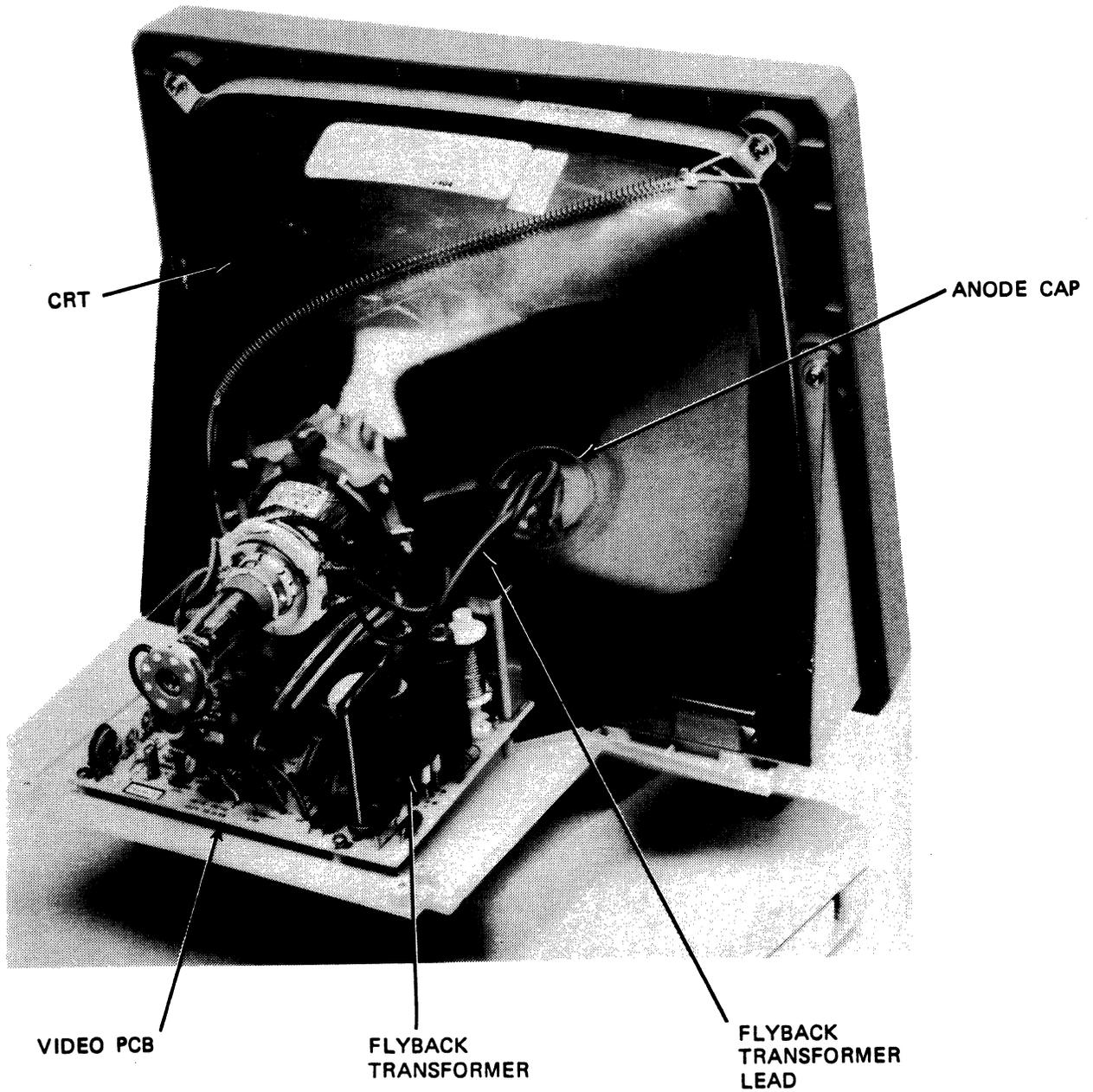


Figure 2-10. Upper Monitor Area

SUBASSEMBLY REMOVAL AND REPLACEMENT

Video PCB

REMOVAL

WARNING

Take special precaution when working in the general area of the CRT. Do not scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass. As a precaution wear suitable clothing and eye protection.

1. Gain access to the upper monitor area. Refer to the Monitor - Back Cover Removal and Replacement procedure.
2. Discharge the CRT high voltage circuit and remove the flyback transformer anode cap as outlined under "Discharging the CRT High-Voltage Circuit."
3. Disconnect the following connectors from the video PCB.

P3	Horizontal yoke deflection,
P4	Vertical yoke deflection,
GND	CRT grounding spring.
3. Remove P19 connector from the Power/Logic PCB.
4. Remove the four screws that secure the video PCB in place, and remove the CRT socket from the neck of the CRT. Remove the video PCB from the monitor.

REPLACEMENT

To replace the Video PCB, perform removal instructions in reverse order.

Discharging the CRT High-Voltage Circuit

Before attempting to remove the CRT assembly, the CRT high-voltage circuit must first be discharged.

WARNING

Even after the video terminal has been turned off, the CRT still retains dangerously high voltage. Be extremely careful not to touch the CRT anode connector or the flyback transformer. Discharge the anode contact before attempting to remove the CRT.

1. Use an insulated jumper cable with alligator clips connected on each end of the jumper cable. Connect one end of the jumper cable to the shank of an insulated screwdriver and the other end of the jumper to chassis ground. Insert the screwdriver blade between the rubber anode cap and the CRT to discharge the anode.
2. After discharging the CRT circuit, remove the jumper cable from the screwdriver and connect it to the CRT anode metal cap (keep the other end of the jumper connected to chassis ground). This prevents the CRT from accumulating any static charge, which normally occurs.

CRT

REMOVAL

CAUTION

Take special precaution when working in the general area of the CRT. Do not scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass. As a precaution wear eye protection and suitable clothing.

1. Gain access to the upper monitor area. Refer to the Monitor - Back Cover Removal and Replacement procedure.
2. Discharge the CRT high voltage circuit in accordance with the procedure outlined under "Discharging the CRT High-Voltage Circuit."
3. Disconnect the anode cap and cable from the CRT anode socket.

SUBASSEMBLY REMOVAL AND REPLACEMENT

4. Lay the terminal face down on a soft surface to avoid scratching the front panel and the CRT surface.
5. Disconnect connectors P3 and P4 (horizontal and vertical yoke deflection leads) from the Video PCB.
6. Disconnect the CRT ground lead connector from the Video PCB (black connector located on top left corner of PCB).
7. Remove the socket from the neck of the CRT.
8. Remove the four screws that secure the CRT against the front bezel.
9. Remove the grounding spring from the CRT.
8. **DO NOT** lift the CRT by its neck or by the yoke assembly. Carefully lift the CRT out and place it face down on a soft surface, or immediately pack the CRT away safely in a suitable shipping container.

NOTE

The deflection yoke is part of the CRT assembly and is aligned for minimum distortion. **DO NOT** remove the yoke from the CRT, but always replace the CRT and yoke together.

REPLACEMENT

To replace the CRT, perform removal instructions in reverse order. Perform any video alignment necessary, refer to Alignment Section 2 in this manual.

SECTION 3

ALIGNMENT

INTRODUCTION

The alignment parameters presented in this section are to be regarded as guidelines only and not as specifications criteria.

Video alignment of the QVT-101™ Terminal is divided into the following alignment procedures. Note: These alignment procedures may be performed in any order.

- Horizontal Display Width (Line Width),
- Vertical Display Height,
- Horizontal Linearity (Uniform Character Width) **check only**,
- Vertical Linearity (Uniform Character Height),
- Brightness,
- Focus,
- Display Centering (Raster Position),

TOOLS AND EQUIPMENT REQUIRED

The following tools are required to perform video alignment of the QVT-101 Terminal:

- Phillips Screwdriver (No. 2),
- Small, Flat Blade (1/8-inch) Non-metallic Screwdriver,
- Multimeter (for brightness and focus alignment procedures),
- A metric ruler may be used in lieu of the templates listed below.

- QVT-101 Field Service Tool Kit (Qume Part Number 84841-02), which consists of:
 - Non-metallic alignment tool, 7/64-inch Hex tip (Qume Part Number 10348-01),
 - Non-metallic screwdriver, 3/16-inch flat tip (Qume Part Number 10349-01),
 - Display Alignment Template, 14-inch CRT (Qume Part Number 10350-02),
 - Character Alignment Template, 14-inch CRT (Qume Part Number 10351-02),
 - Keycap Extraction Tool (Qume Part Number 84873-01).

ALIGNMENT CONDITIONS

Before attempting an alignment, the applicable alignment procedure should be thoroughly read and understood. Performed alignment procedures under the following conditions:

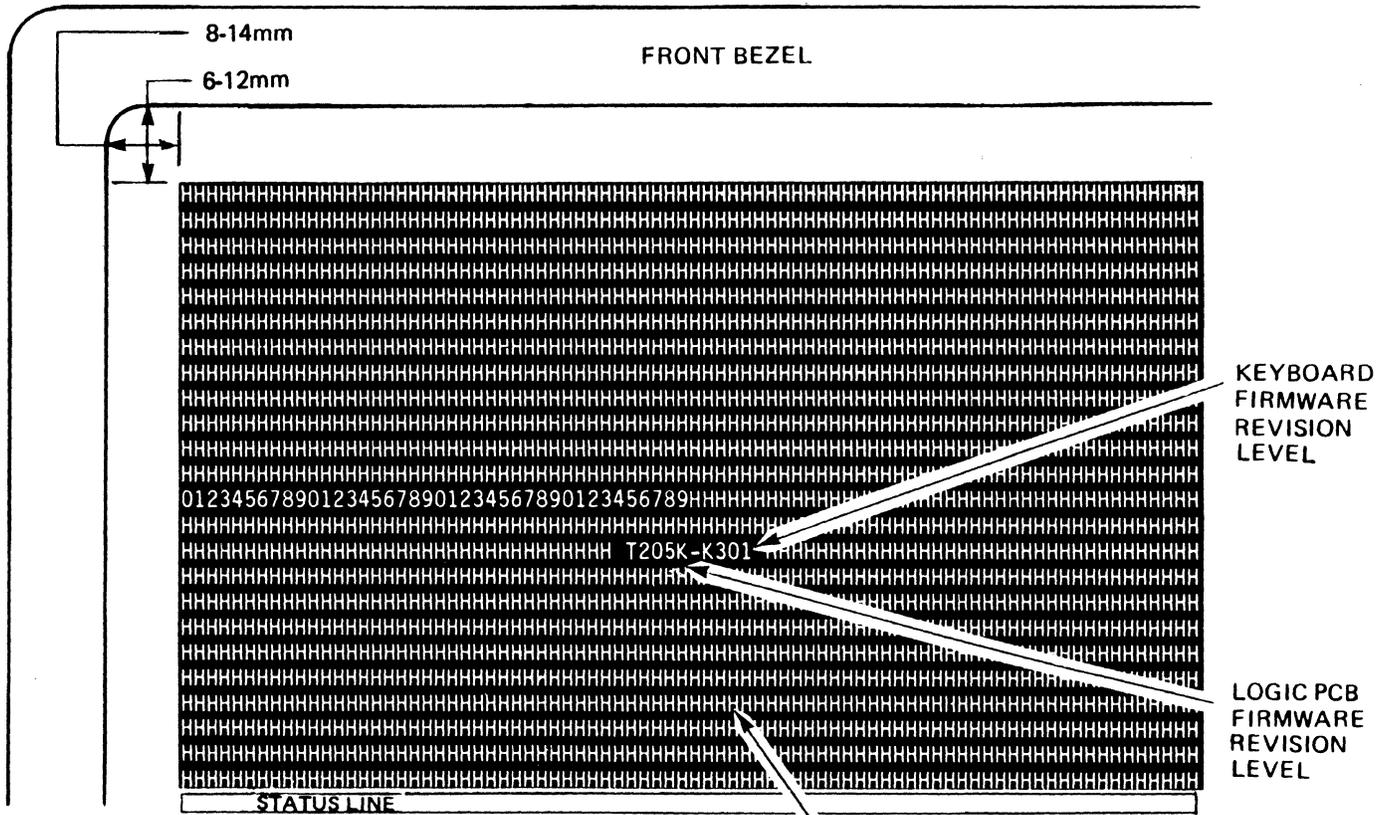
- Warm-up. Allow the terminal to stabilize at its operating temperature; approximately ten minutes.
- Back cover removed. Refer to the Monitor - Back Cover Removal and Replacement procedure in Section 2.
- Local Mode. Configure the terminal for local mode operation.
- Standard Video/Reverse Video. Perform all alignment procedures in the terminal's normal operating display condition.
- "H" Test Pattern displayed. The terminal has a built-in test pattern that displays a full screen of "H" characters and identifies the firmware revision level. To display the "H" test pattern, simultaneously depress the Ctrl/Shift/Setup keys followed by the zero key. The monitor screen will be filled with the H pattern as shown in Figure 3-1.

CAUTION

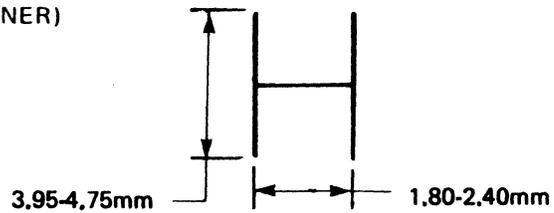
Take care when handling the CRT. Do not scratch or strike the CRT or subject it to unusual pressure. The CRT contains a high vacuum and breakage of the tube may result in injury from flying glass.

Hazardous voltages are present in the general area of the flyback transformer lead and the CRT anode cap. Exercise caution to avoid electrical shock when performing any video alignment procedure. Remember that the terminal is powered ON.

Figure 3-1. The QVT-101 "H" Test Pattern



DISPLAY DIMENSIONS (EACH CORNER)

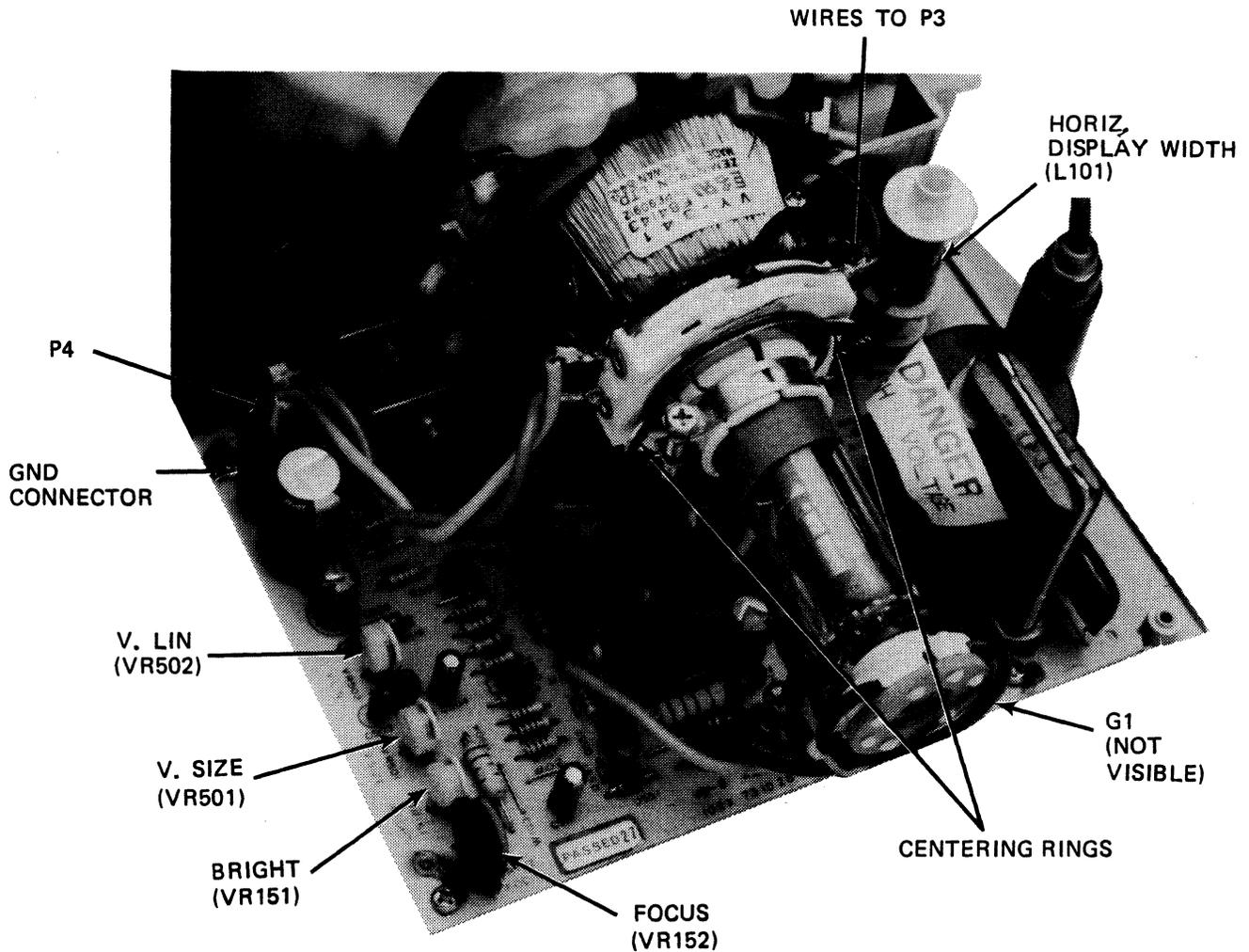


CHARACTER DIMENSIONS

ALIGNMENT

VIDEO ALIGNMENT PROCEDURES

Video alignment of the QVT-101 Terminal is accomplished by adjusting one or more of the adjustment components shown in Figure 3-2. Each alignment procedure is described below.



LEGEND

VR501	Vertical Display Height
VR502	Vertical Linearity
VR151	Brightness
VR152	Focus
L101	Horizontal Display Width
G1	Test Point
Centering Rings	Display Centering

Figure 3-2. Location of Video Alignment Components

Horizontal Display Width (Line Width)

The Horizontal width display may be checked for accuracy and adjusted in one of two ways as described below:

1. Display the "H" Test Pattern (Ctrl/Shift/Setup-Zero).
- 2a. Using the Display Alignment Template (Qume Part Number 10350-02), proceed as follows:

Place the Display Alignment Template against the front of the CRT so that the Qume logo appears at the top and slide it towards the left (in the direction of the arrow near the bottom of the template) until its left edge rests against the left side of the front bezel. Be certain that the template remains in this position throughout this procedure. The horizontal display width is properly aligned when the outer edges of the "H" characters in the test pattern lie between the outer edge of the two pairs of border lines near the left and right sides of the template.

When taking this measurement of the test pattern, be careful to minimize parallax distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

- 2b. Using a Metric Ruler:

The distance between the inner edge of the front bezel and the outer edge of the first (last) character "H" may be measured using a metric ruler with accurate fine graduations. Near all four corners of the front bezel, this distance should be the same and lie within 11 ± 3 mm as shown on the "H" Test Pattern (Figure 3-1).

When taking this measurement of the test pattern, be careful to minimize parallax distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

3. If adjustment is required, rotate L101 (Horizontal Display Width) on the Video PCB (see Figure 3-2) with a non-metallic 7/64-inch Alignment Tool (Qume Part Number 10348-04) until the display has the proper width. Clockwise rotation increases the display width and counterclockwise rotation reduces display width.
4. Verify that display height, linearity and position are still correct. If necessary, readjust.

Vertical Display Height

The Vertical display height may be checked for accuracy and adjusted in one of two ways as described below, proceed as follows:

1. Display the "H" test pattern (Ctrl/Shift/Setup-Zero).
- 2a. Using the Display Alignment Template (Qume Part Number 10350-02):

Place the template against the front of the CRT so that the Qume logo appears at the top, and slide it towards the left (in the direction of the arrow near the bottom of the template) until its left edge rests against the left side of the front bezel. Be certain that the template remains in this position throughout this procedure. The vertical display height is properly aligned when the top edge of the top line of "H" characters in the test pattern lie between the outer edges of the two pairs of border lines near the top and bottom of the template.

When taking this measurement of the test pattern, be careful to minimize parallax distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

- 2b. Using a Metric Ruler:

The distance between the inner edge of the front bezel at the top and the top edge of the first line of "H" characters or at the bottom of the bezel and the bottom edge of the status line may be measured using a metric ruler with accurate fine graduations. Near all four corners of the front bezel, this distance should be the same and lie within 9 ± 3 mm as shown on the "H" Test Pattern (Figure 3-1).

When taking this measurement of the test pattern, be careful to minimize parallax distortion, i.e., move the position of "head and eyes" so that each reading is taken at a 90 degree angle to the screen (straight on).

3. If adjustment is required, change the setting of the VR501 control (Vertical Display Height) on the Video PCB (see Figure 3-2). Using a small non-metallic standard flat blade screwdriver, clockwise adjustment of VR501 increases display height; counterclockwise rotation reduces display height.
4. Verify that display width, linearity and position are still correct. If necessary, readjust.

Horizontal Linearity (Uniform Character Width)

Horizontal linearity, or uniform character width is not adjustable. In the field a check only is possible.

1. Display the "H" test pattern (Ctrl/Shift/Setup-Zero).
2. Measure character width at five locations in the test pattern (near each corner and the center). If the Character Template (Qume Part Number 10351-02) is used, proper character width will appear too wide for the narrower part (minimum window) and too narrow for the wider part (maximum window) of the Character Width cutout when the template is held against the surface of the CRT. If a template is not available, a metric ruler with accurate fine divisions may be used for this measurement. A character width of 1.80 to 2.40 mm is acceptable.

Vertical Linearity (Uniform Character Height)

Vertical linearity, or uniform character height, is considered to be properly adjusted when a sampling of measurements taken at various locations of the "H" Test Pattern, reveals a character height of approximately 4.35 mm. If adjustment is required, proceed as follows:

1. Display the "H" test pattern (Ctrl/Shift/Setup-Zero).
2. Measure character height at five locations in the test pattern (near each corner and in the center). If a Character Alignment Template (Qume Part Number 10351-02) is used, proper character height will appear too high for the narrower part (minimum window) and too low for the wider part (maximum window) of the Character Height cutout when the template is held against the surface of the CRT. If a template is not available a metric rule with accurate fine divisions may be used for this measurement. A character height of 3.95 to 4.75 mm is acceptable.
3. Change the setting of the Vertical Linearity control VR502 on the Video PCB (see Figure 3-2) for the proper character height. Using a small non-metallic standard flat blade screwdriver, adjust VR502 clockwise to increase character height or counterclockwise to reduce character height.
4. Check horizontal linearity; if necessary, readjust.

Brightness

Display brightness can be adjusted as follows:

1. Display the "H" Test Pattern (Ctrl/Shift/Setup-Zero).
2. Rotate the external brightness control on the display module pedestal fully counterclockwise.
3. Locate pot VR151 on the Video PCB (see Figure 3-2), and with a small non-metallic flat blade screwdriver, adjust VR151 until the background raster is just visible.

ALIGNMENT

4. Locate test point G1 on the Video PCB (see Figure 3-2) and measure the DC voltage between G1 and ground. Note: This voltage may be a positive or negative voltage. Record the voltage observed.
5. Rotate VR151 to reduce the voltage observed between G1 and ground by approximately 3 volts.

Focus

Display focus can be adjusted as follows:

1. Display the "H" Test Pattern (Ctrl/Shift/Setup-Zero).
2. Locate VR152 on the Video PCB (see Figure 3-2), and with a small non-metallic flat blade screwdriver, adjust VR152 for optimum focus at the center of the display. Optimum focus occurs when the individual dots that form a character are well defined and clear. Note the setting of the control.
3. Observe a corner area of the display and change the setting of VR152 for optimum focus there. Note the setting of the control.
4. Carefully adjust VR152 for optimum focus setting between center and corner of screen areas.

Display Centering (Raster Position)

The display is considered to be centered when the bottom edge of the status line and the top edge of the first line of the "H" Test Pattern, are parallel to and visible between the parallel maximum and minimum lines on the Display Alignment Template. The raster position may be changed by rotating the centering rings on the back end of the CRT yoke (see Figure 3-2). These rings are glued in place to prevent a change in position from vibrations and should only be broken loose if a raster adjustment is really necessary. If adjustment is required, proceed as follows:

1. Display the "H" Test Pattern (Ctrl/Shift/Setup-Zero).
- 2a. Position the Display Template (Qume Part Number 10351-02) over the "H" test pattern. (Tape the template to the front bezel so that it is securely held in place.) If the display is correctly centered, the edges of the "H" test pattern and status line will be visible between the parallel maximum and minimum lines on the display template. If a template is not available proceed with step 2b.
- 2b. On a sheet of paper with straight edges, make two sets of marks along the edges near a corner at the distances and tolerances from the corner shown by the H Test Pattern on Figure 3-1. By holding this paper scale directly against the CRT surface, use the marks to measure and to adjust the display centering. A flexible metric ruler with accurate divisions may be used in place of the paper scale.

When measuring the display position of the test pattern, be careful to minimize parallax distortion, i.e., move the position of "heads" and "eyes" so that each reading is taken at a 90 degree angle to the screen surface (straight on).

3. Only if a display centering adjustment is required, carefully break the centering rings on the yoke of the CRT loose and rotate the rings as required to center the display.

NOTE

Do not loosen the deflection yoke clamp; the yoke position has been fixed at the factory and should not be changed in the field.

4. Check for proper display size and linearity if the setting of the centering rings has been changed.
5. Use some Glyptal (or equivalent) and fix the position of the rings after adjustment to prevent inadvertent movement of the rings due to vibration.

SECTION 4

PARTS

This section summarizes replacement parts and recommended spares for the QVT-101 Terminal. Stylized exploded view diagrams are provided to assist in identifying and locating parts in the QVT-101 Terminal.

PARTS
REPLACEMENT PARTS

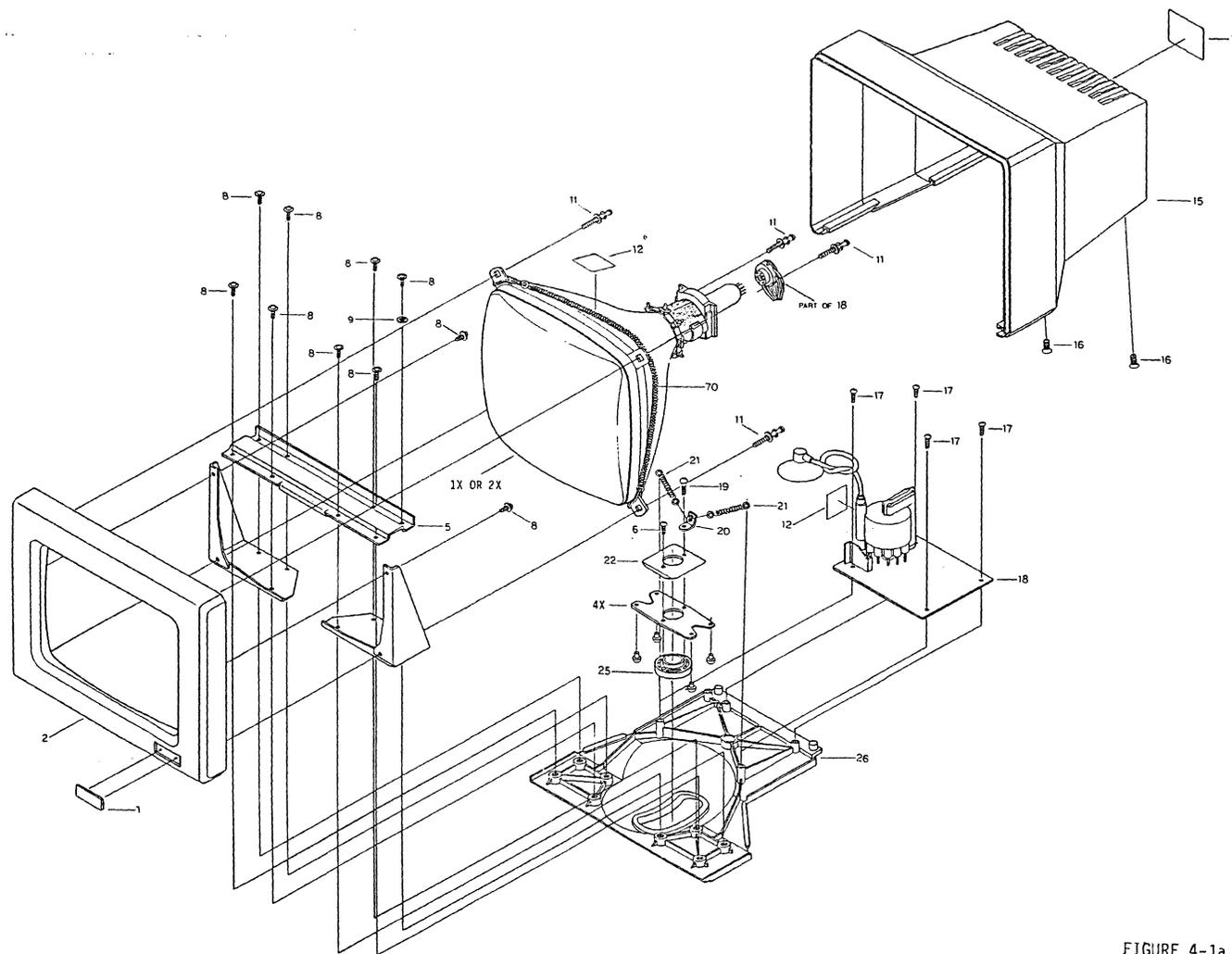


FIGURE 4-1a
QVT-101 UPPER MONITOR AREA

PARTS

Table 4-1a. QVT-101 Upper Monitor Area Parts

ITEM	PART NUMBER	DESCRIPTION
1x	301485-01	CRT & Yoke Assembly, Green 14" CRT (assembly only, not available separately)
2x	301485-02	CRT & Yoke Assembly, Amber 14" CRT (assembly only, not available separately)
2	10000-02	Front Panel (without Logo)
4x	301550-01	Pressure Spring w/slide chips (assembly only, not available separately)
6	10005	Screw, M4 x 0.7 x 10
7	10011	Qume Logo
8	301208-01	Screw, M4 x 0.7 x 9
11	10314	Screw, M4 x 0.7 x 16
14	301619-01	Rating Name Plate, 115V
	301620-01	Rating Name Plate, 230V
15	10010-02	Display Module Top Back Cover (without name plate)
16	10030	Screw, Flat Head; M4 x 0.7 x 10
18	301482-01	Video PCB Assembly, 14" CRT w/Wire Harness Assembly and Connector
19	10017	Screw, Neck Fixating
20	10018	Neck Spring Hook
21	10019	Tension Spring
22	10016	Washer, Slide Fixating
25	10013	Slide Block
26	10012	Tilt Neck
70	10007	Grounding Spring

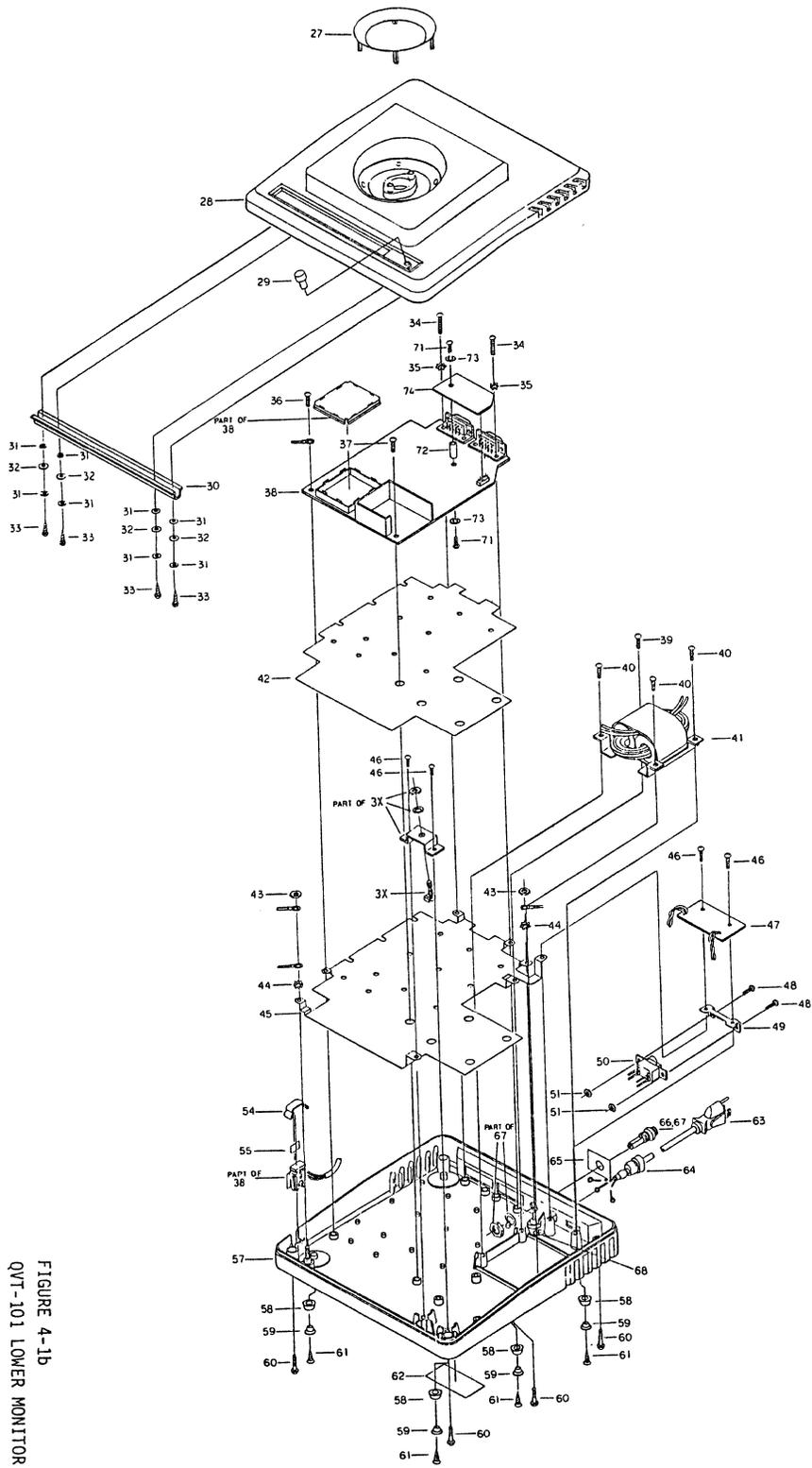


FIGURE 4-1b
QVT-101 LOWER MONITOR AREA

PARTS
REPLACEMENT PARTS

PARTS

Table 4-1b. QVT-101 Lower Monitor Area Parts

ITEM	PART NUMBER	DESCRIPTION
3x	301484-01	Brightness Control w/wiring and connector (assembly only, not available separately)
27	10029	Slide Ring
28	301042-01	Lower Cabinet Top
29	10028	Brightness Control Knob
33	10034	Screw, Round Head; M3 TPA x10
34	301621-01	Screw, M3 x 0.5 x 10
36	301587-01	Screw, M3 x 0.5 x 6
37	301622-01	Screw, TPP-3 x 8
38	390210-200	Power/Logic PCB Assembly, RS-232-C w/keyboard connector
39	301623-01	Screw, M3.5 x 0.6 x 10
	390210-100	Firmware Kit, Program EPROM, U10
	10149	Microprocessor, 6800, U11
	301639-01	Character Generator EPROM, U28
	84806-01	Battery, RAM Back-Up, 3V (Lithium, Sanyo CR 2032)
40	301624-01	Screw, TPP-3.5 x 15
41	301486-01	Line Transformer Assembly, 115VAC/60 Hz
	301486-02	Line Transformer Assembly, 230VAC/50 Hz
42	301625-01	Insulation Film (ESD)
45	301628-01	ESD Shield Plate
46		Screw (use item #37)
47	10309-02	Filter PCB Assembly
48		Screw (use item #36)

PARTS

Table 4-1b. QVT-101 Lower Monitor Parts (Cont.)

ITEM	PART NUMBER	DESCRIPTION
49	10052	Power Switch Mounting Bracket
50	84805-01 84805-02	AC Line Switch, 115VAC AC Line Switch, 230VAC
	301634-01	Power Cord Set, Europe
	301635-01	Power Cord Set, International
51	10023	Nut, M3 x 0.5
52	301630-01	Brightness Control Bracket
54	10047	Cover, Keyboard Connector w/wiring
55	10046	Insulation Film
57	301631-01	Display Module Bottom Cover (w/o name plate)
58	10063	Equipment Foot, Cushion
59	10064	Cushion Washer
60	10066	Screw, M4 x 0.7 x 14
61	10065	Screw, Flat Head; M3 TPA x 10
63	301633-01 301634-01 301635-01	Power Cord, USA Domestic Power Cord, Europe Power Cord, International
64	301638-01	Cable Bushing, Power Cord
65	301636-01 301637-01	Fuse Name Plate, USA Domestic Fuse Name Plate, International
66	94096-01 301638-01	Line Fuse, 3AG, 1A, 250 VAC, UL Line Fuse, DIN, 0.5A, 250 VAC, VDE
67	10059-01 10059-02	Fuse Holder (115 VAC) w/nut and washer Fuse Holder (230VAC) w/nut and washer
71		Screw (use item #37)

PARTS

Table 4-1b. QVT-101 Lower Monitor Parts (Cont.)

ITEM	PART NUMBER	DESCRIPTION
72	301476-01	Nylon Spacer, 14mm long
74	301048-01 301048-02	Current Loop PCB Assembly (option) RS-422-A PCB Assembly (option)

Keyboard (Not Illustrated)

301220-01	Keyboard Assembly, USA Domestic
84813-110	8048C-405A Microprocessor (Keyboard)
10244	Coiled Cable Assembly (Keyboard)

PARTS
REPLACEMENT PARTS

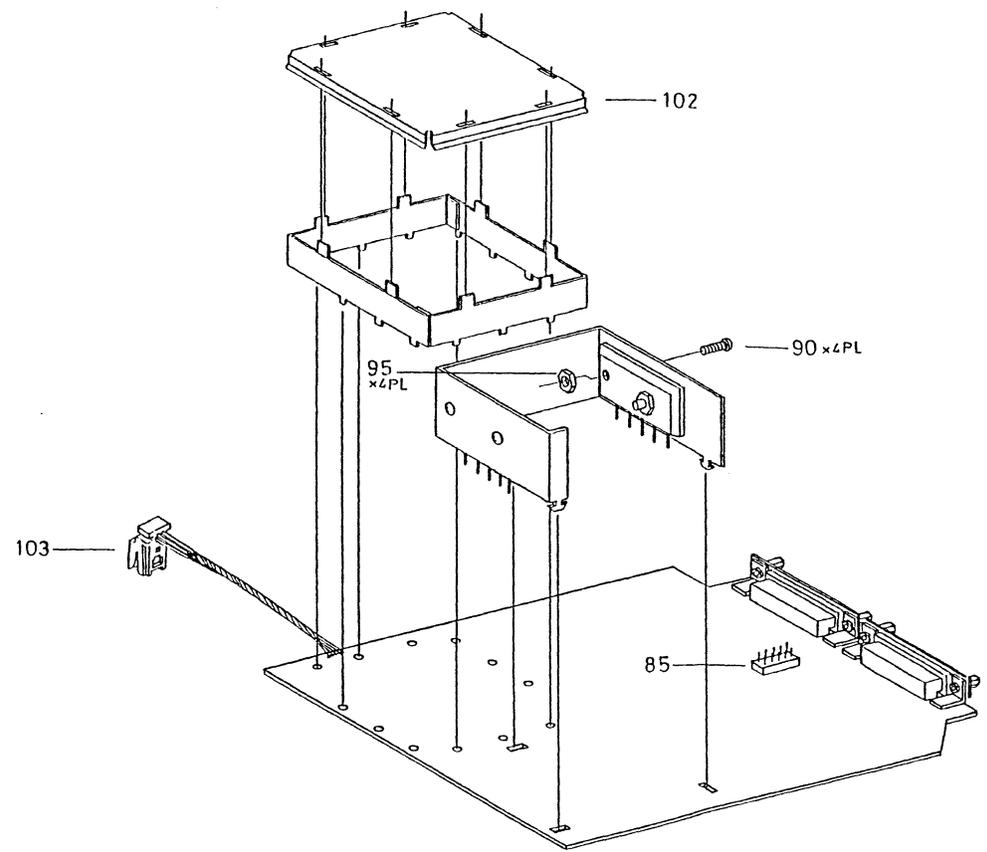


FIGURE 4-2
QVT-101 PWR/LOGIC PCB

PARTS

Table 4-2. QVT-101 Power/Logic PCB Parts

ITEM	PART NUMBER	DESCRIPTION
85	301281-01	Male Connector, PS-10PE-D4T1-PN1
90	301658-01	Screw, M3 x 0.5 + 12P-NI
95	10023	Nut M3 x B5.5 x H2.4 - NI
102	301665-01	Shield, Wall Cover
103	301666-01	Housing Connector Set, Tel Jack - LB

PARTS

RECOMMENDED SPARE PARTS

Table 4-3 identifies all QVT-101 Terminal recommended spare parts.

Table 4-3. QVT-101 Recommended Spare Parts

PART NUMBER	DESCRIPTION	QTY PER 1000	QTY PER 10,000
301220-01	Keyboard Assembly	20	100
10244	Coiled Cable Assembly, Keyboard	5	20
84813-110	8048-405A Microprocessor, Keyboard	5	20
301482-01	Video PCB Assembly, 14-inch CRT w/wire Harness Assembly (VB to LB)	20	100
390210-200	Power/Logic PCB Assembly, RS-232-C w/keyboard connector	20	150
301048-01	Current Loop PCB Assembly (option)	20	150
301048-02	RS-422-A PCB Assembly (option)	20	150
301484-01	Brightness Control Assembly w/wiring	10	30
10028	Brightness Control Knob	10	50
84805-01	AC Line Switch (115 VAC)	15	50
84805-02	AC Line Switch (230 VAC)	15	50
84806-01	Battery, RAM Back-Up, 3V (Lithium)	10	25
301485-01	CRT & Yoke Assembly, Green 14" CRT	5	25
301485-02	CRT & Yoke Assembly, Amber 14" CRT	5	25
301486-01	Line Transformer Assembly, 115V/60 Hz	5	20
301486-02	Line Transformer Assembly, 230V/50 Hz	5	20

LB =

Power/Logic PCB

VB = Video PCB

SECTION 5

CIRCUITS AND DIAGRAMS

The following circuits and diagrams of the QVT-101 Terminal are provided for reference:

- QVT-101 Functional Block Diagram
- QVT-101 Interconnect Diagram
- QVT-101 Keyboard Schematic Diagram
- QVT-101 Video PCB Schematic Diagram
- QVT-101 Power/Logic PCB Schematic Diagram (8 Sheets)
- QVT-101 Filter PCB Schematic Diagram

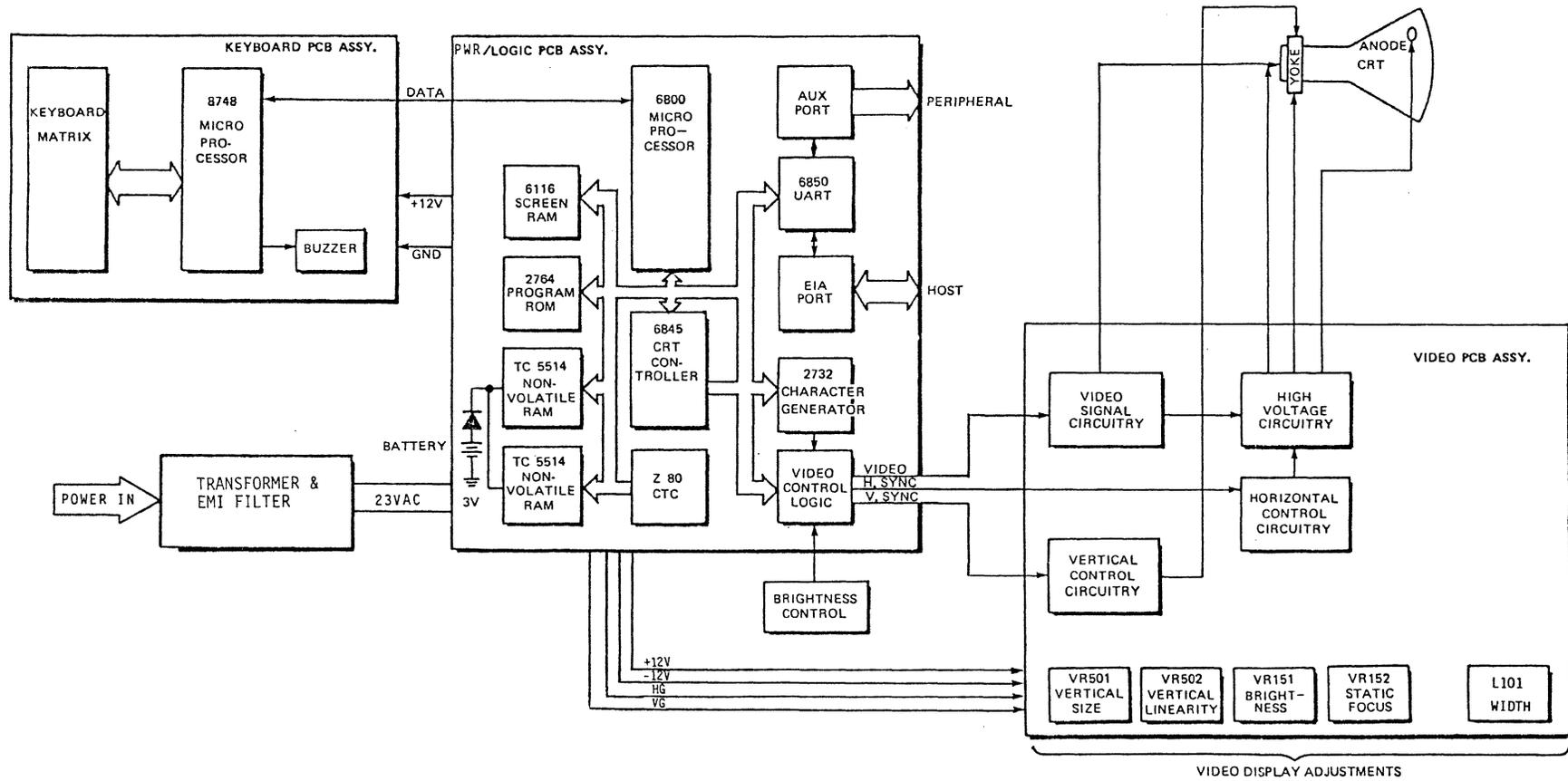


FIGURE 5-1
QVT-101 FUNCTIONAL BLOCK DIAGRAM

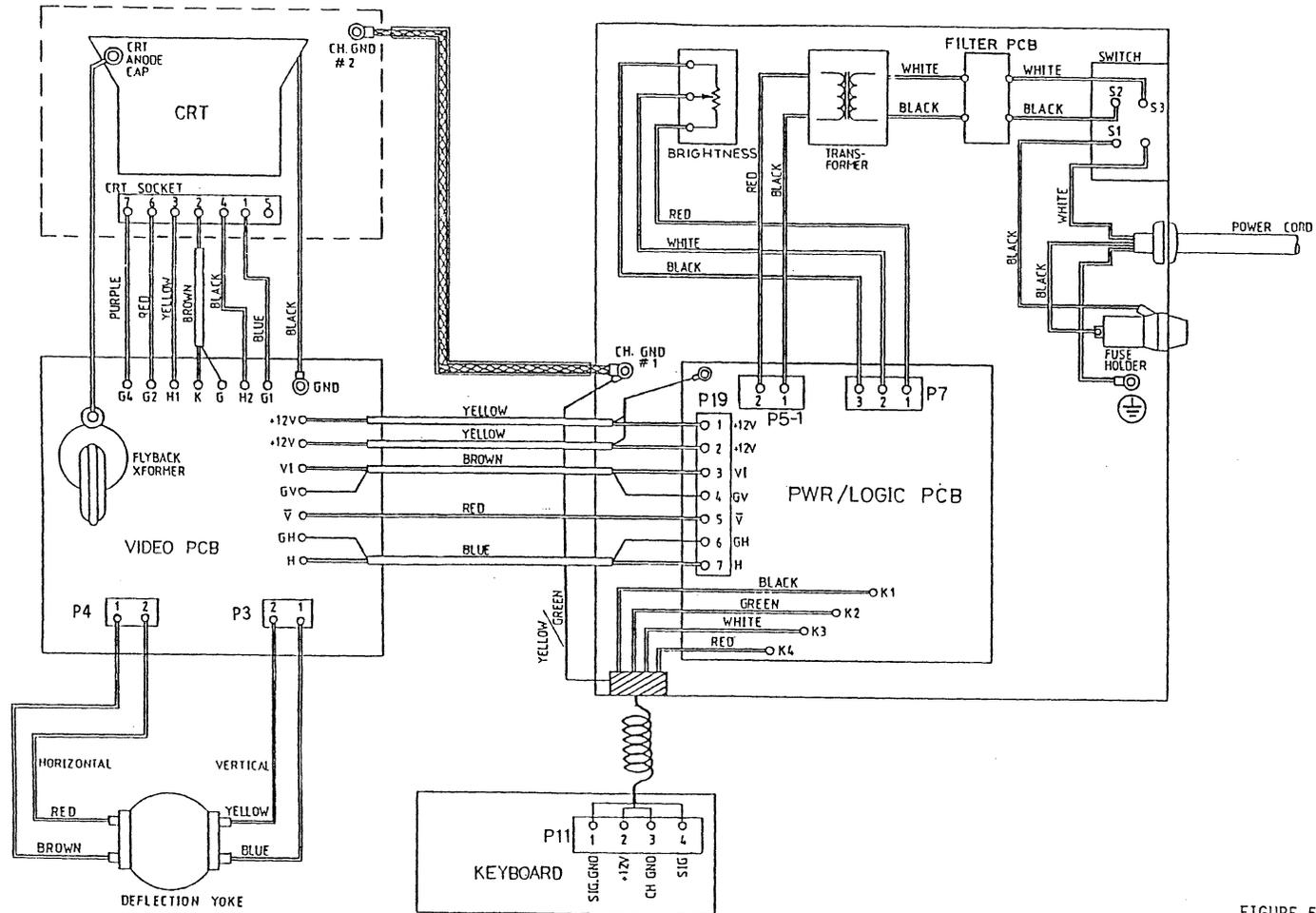


FIGURE 5-2
QVT-101 INTERCONNECT WIRING DIAGRAM

2. ALL RESISTORS ARE EXPRESSED IN OHMS, 1/4W, ± 5%.
3. ALL CAPACITORS ARE EXPRESSED IN FARADS, 50V.
4. VOLTAGES ARE DIRECT CURRENT.
5. C.C.: CARBON COMPOSITION RESISTOR.

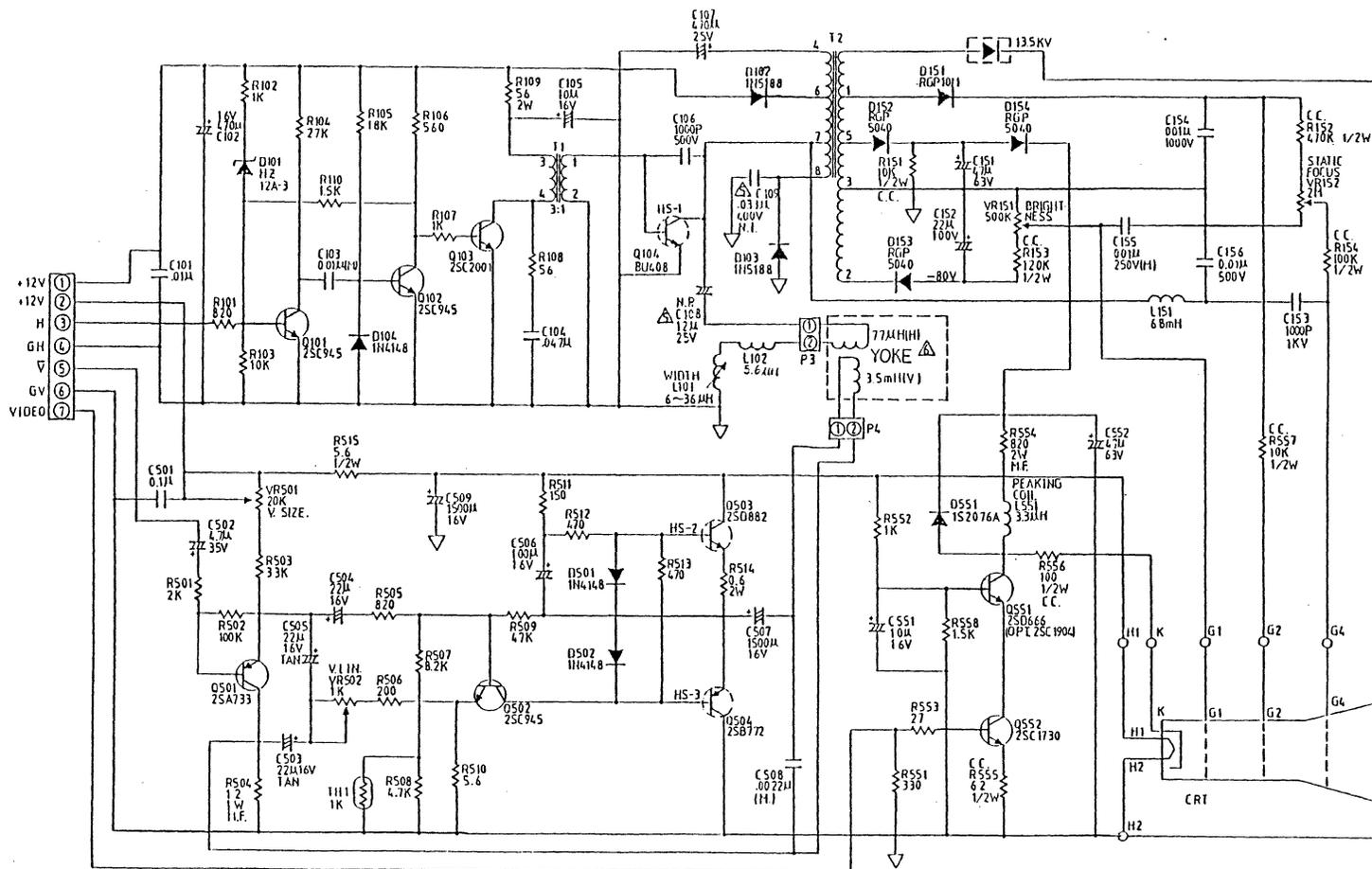


FIGURE 5-4
QVT-101 VIDEO PCB SCHEMATIC

CIRCUITS AND DIAGRAMS

2. ALL RESISTORS ARE EXPRESSED IN OHMS, $1/4W \pm 5\%$.
 ALL CAPACITORS ARE EXPRESSED IN FARADS, 50V.
3. TYPE IDENTIFICATION FOR 7400 SERIES IC'S IS OBTAINED BY
 PREFIXING NUMBER WITH 74. EX: 04=7404.

[4]	NORMAL	OPTION
DCD	W2	W1
DTR	W8	W7

- [5] CHARACTER SET SELECTIONS:
 W3 SELECT U.S. CHARACTER SET.
 W4 SELECT G.M. CHARACTER SET.
 W5 SELECT U.K. CHARACTER SET.
 W6 SELECT F.R. CHARACTER SET.
6. VOLTAGES ARE DIRECT CURRENT.

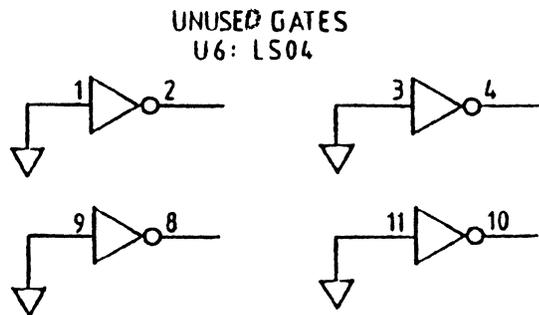


FIGURE 5-5. QVT-101 PWR/LOGIC PCB SCHEMATIC

(sheet 1 of 8)

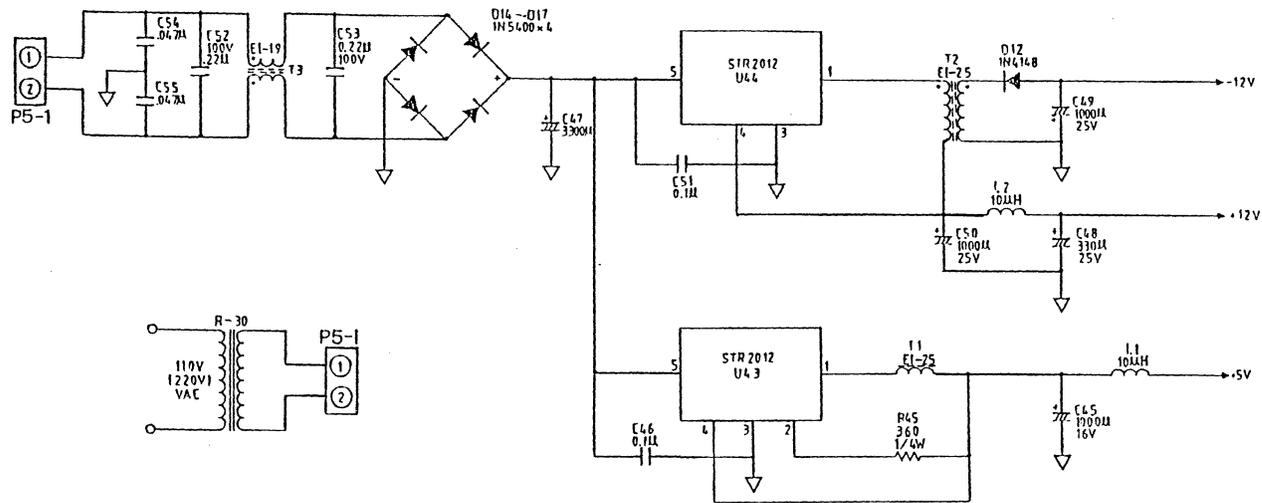


FIGURE 5-5
QVT-101 PWR/LOGIC PCB SCHEMATIC
(sheet 2 of 8)

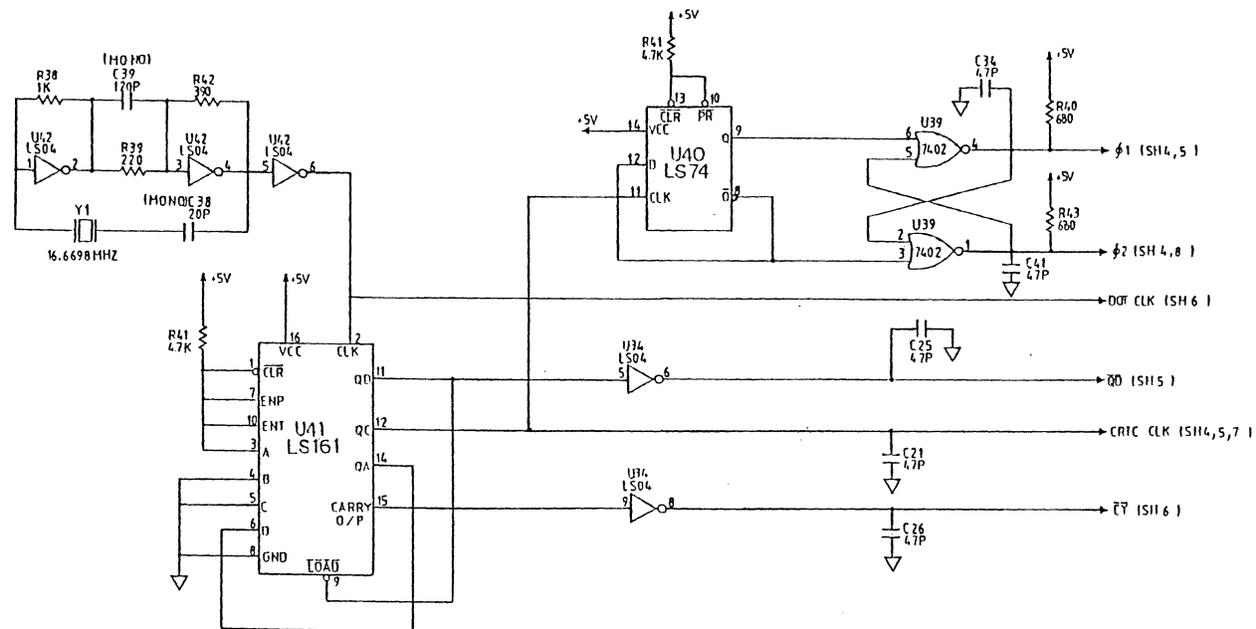


FIGURE 5-5
 QVT-101 PWR/LOGIC PCB SCHEMATIC
 (sheet 3 of 8)

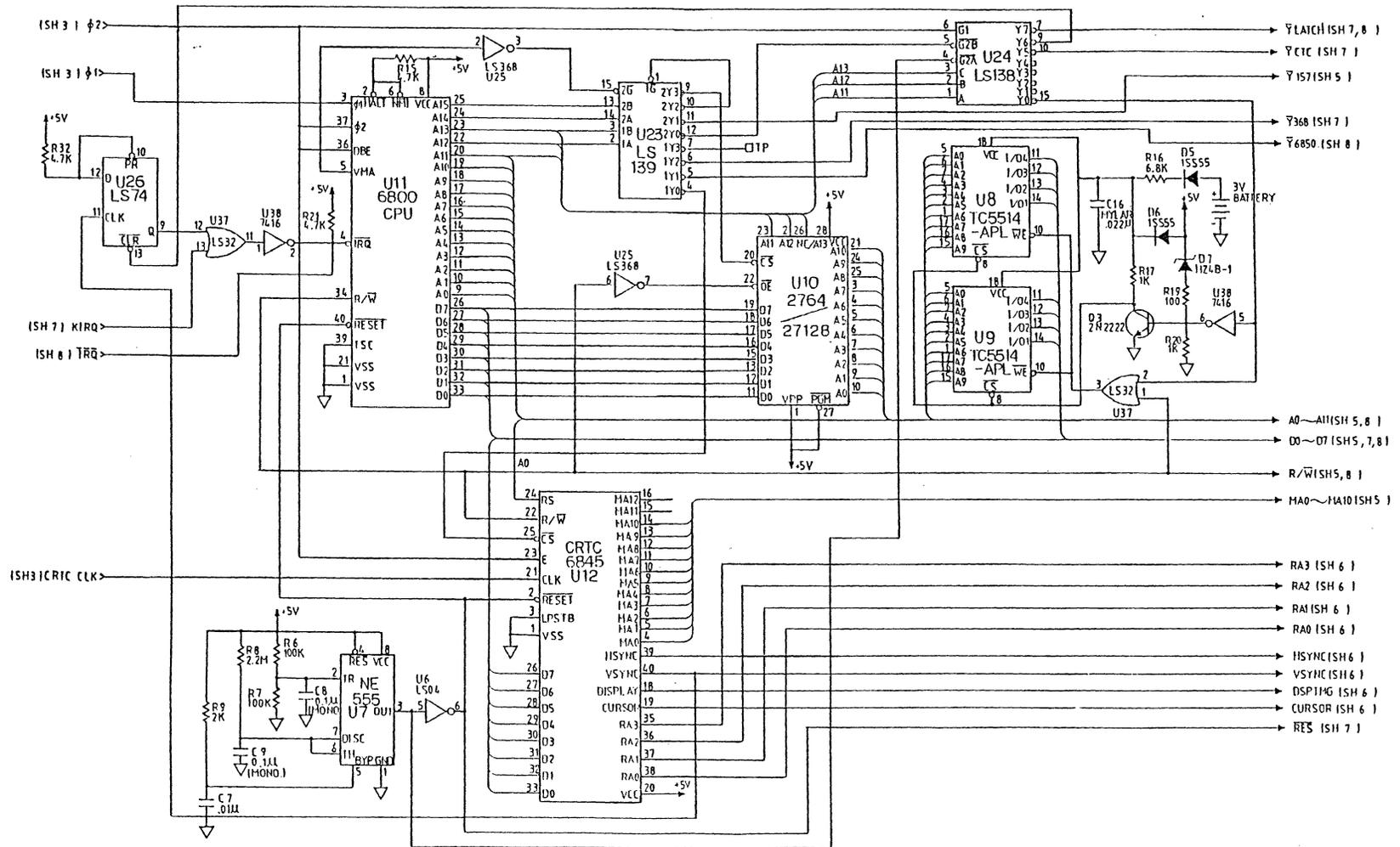


FIGURE 5-5
QVT-101 PWR/LOGIC PCB SCHEMATIC
(sheet 4 of 8)

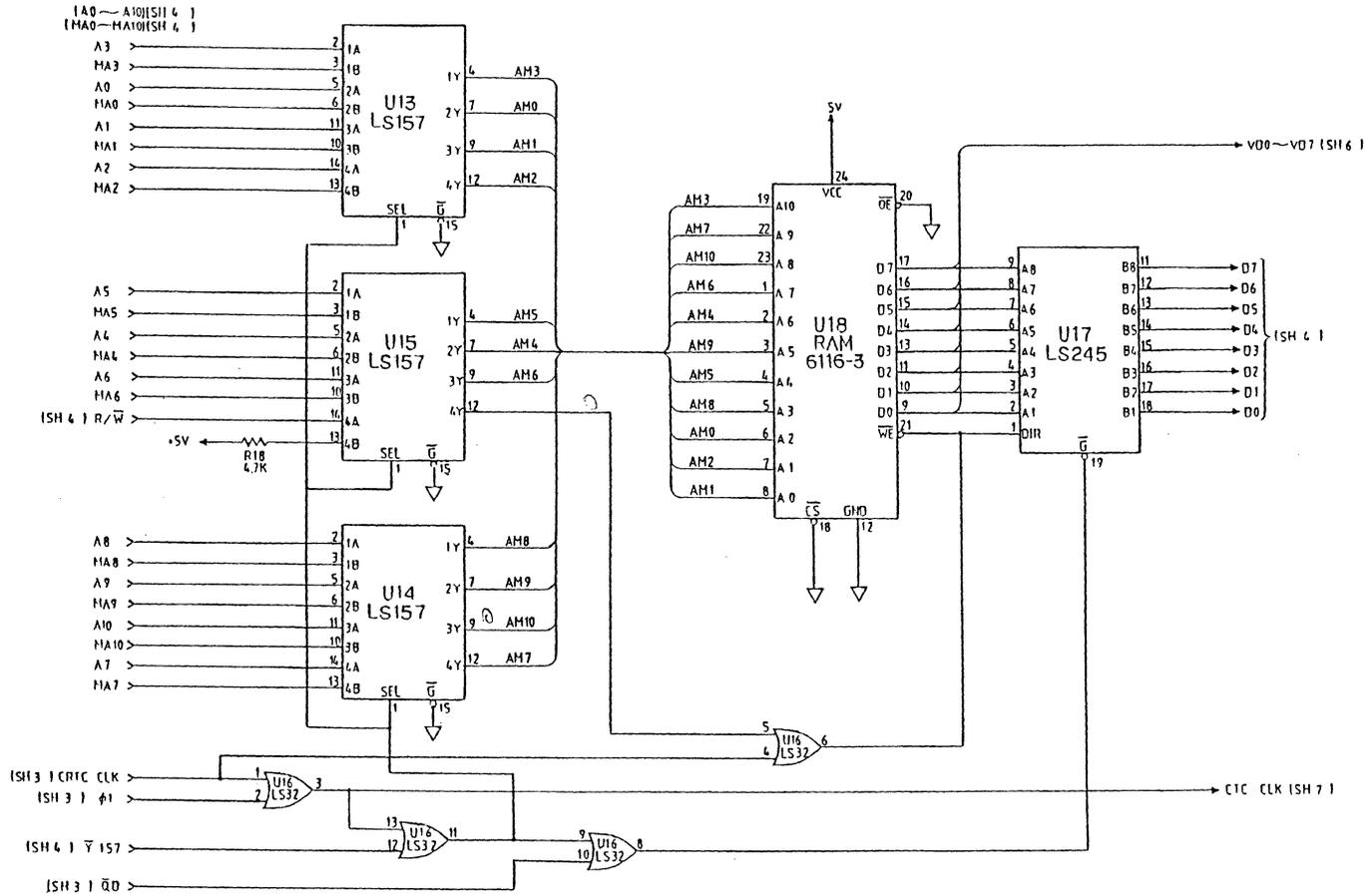
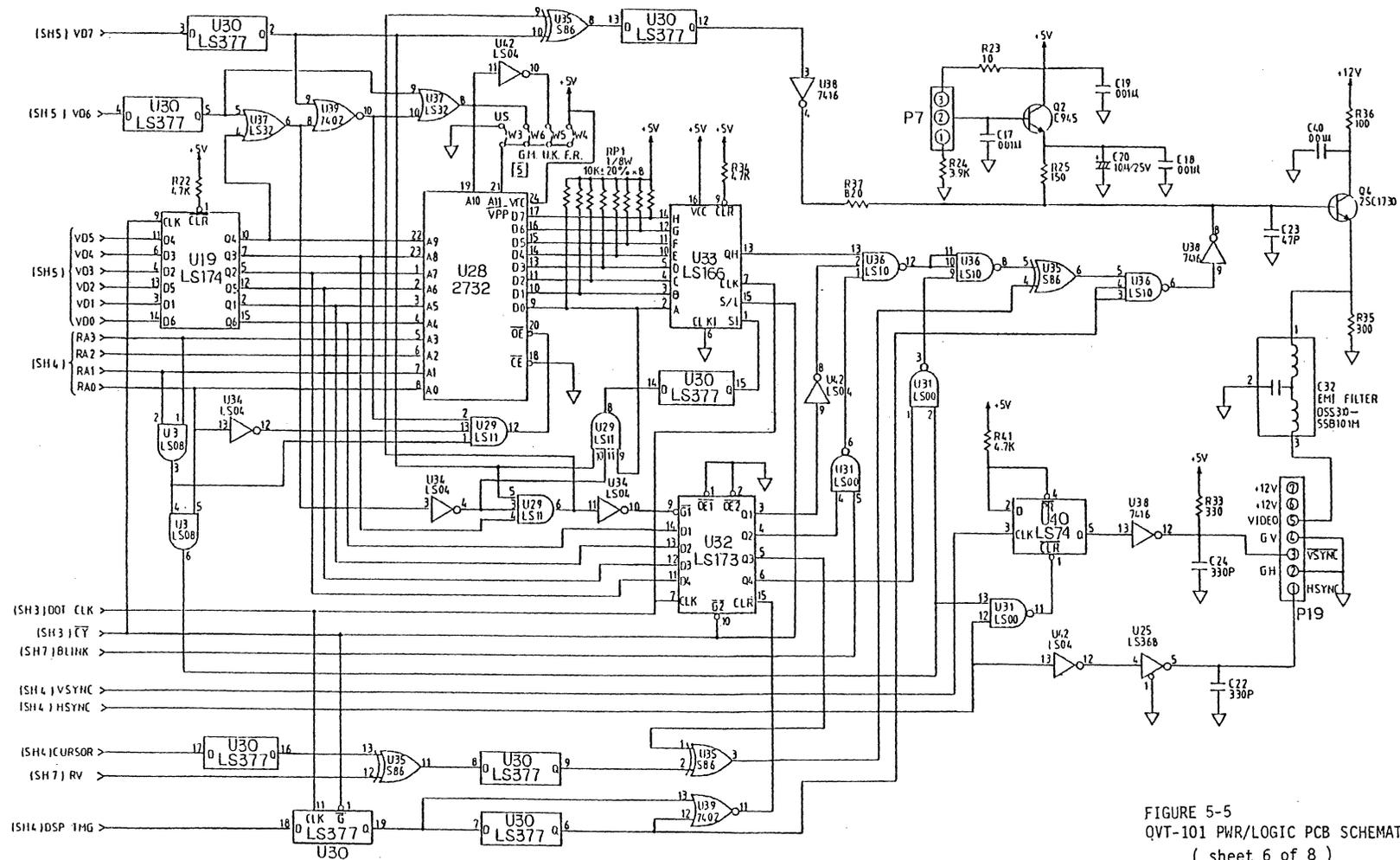


FIGURE 5-5
QVT-101 PWR/LOGIC PCB SCHEMATIC
(sheet 5 of 8)



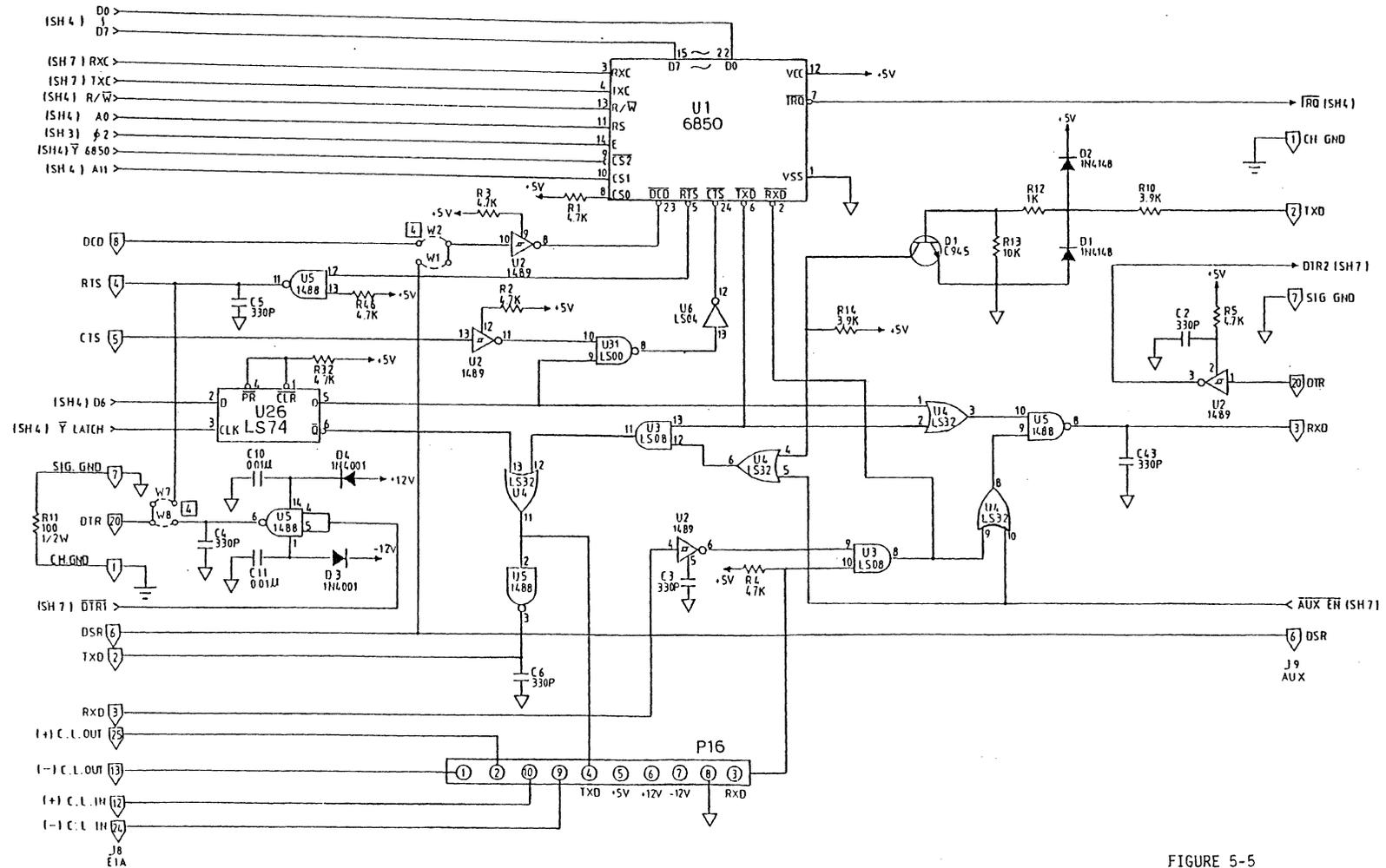


FIGURE 5-5
QVT-101 PWR/LOGIC PCB SCHEMATIC
(sheet 8 of 8)

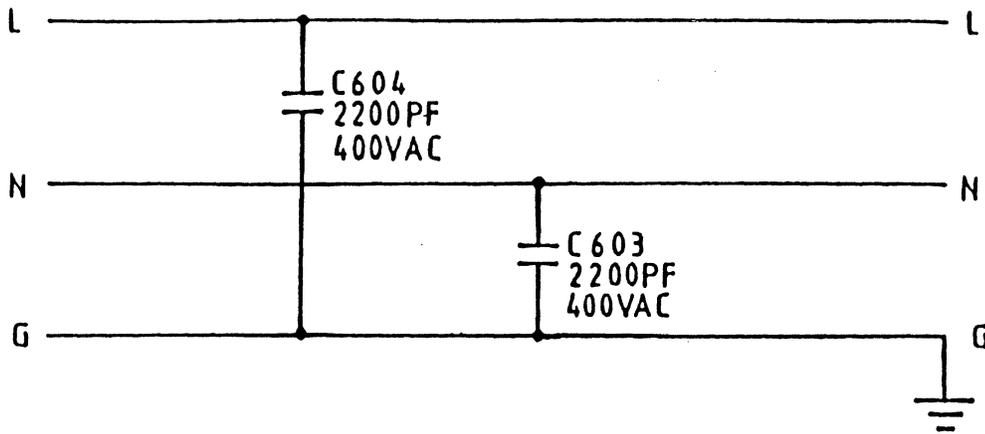


Figure 5-6. QVT-101 Filter PCB Schematic Diagram

REQUEST FOR READER'S COMMENTS

Qume Corporation wishes to provide documents that meet the needs of all QVT product users. Returning this form with your comments will help us to assure that we always produce quality manuals. Thank you.

1. Please specify by page, any errors you found in this manual.

2. Does the document offer the information you expect and require?

3. Is the document clearly written and to the proper level? Please note any areas where the wording is difficult to understand.

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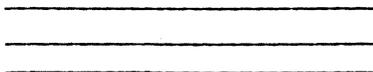
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